Spectrum® Technologies, Inc.

"To Measure Is To Know"

Weather & Environmental Monitoring
Nutrient Management
Soil & Water Quality
Integrated Pest Management

Better Information, Better Decisions, Better Growth.

www.specmeters.com

2009 INTERNATIONAL

Spectrum Technologies, Inc.

20 PLUS YEARS OF SERVING YOU!

Welcome, and thank you for your interest in Spectrum Technologies.

For over 22 years, we have remained focused on one primary objective: improving the profitability and efficiency of our customers.

We recognize the challenges you face: the high costs of fertilizer and other crop inputs, scarce water resources, plant disease, insect damage, and more.

Our 2009 catalog features a broad range of solutions that originated by listening to our customers, who include some of the world's leading researchers, growers, and consultants. Our distributors, a select group of the industry's leading suppliers, enhance our solutions by providing expert advice and access to our complete product line in over 80 countries around the world. As a world leader in measurement technology, you can count on us for the field measurement tools you need, today and tomorrow.

We wish you a safe and prosperous year, and look forward to serving you.

Sincerely,

David Lau
Vice President – International
Spectrum Technologies, Inc.

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Integrated Plant Management

- **Environment:**
  Temperature, Light, Rain, Relative Humidity and Leaf Wetness
- **Nutrition:**
  Nutrients, Chlorophyll and pH Levels
- **Pest and Diseases:**
  Insects, Diseases and Nematodes
- **Soil and Water:**
  pH, Soil Moisture, Soil Compaction, Water Quality and Soil Gases

***Spectrum* Technologies** *is your source for field measurement technology!*

Award Winning Products

The American Society of Agricultural and Biological Engineers has named sixteen Spectrum products AE50 award winners. These products were selected by a panel of experts in the agricultural, food and biological systems industries for the ability to save producers time, cost and labor while operating in an environmentally-friendly fashion.

AE50 outstanding innovations
AWARD WINNER
FOR TECHNOLOGY INNOVATION

- 2008 WatchDog Sprayer Station
  SpecMaps Web Mapping Utility Software
- 2007 WatchDog 2000 Series Mini Weather Station
- 2005 SpecWare Software
- 2004 FieldScout Direct Soil EC Probe
  FieldScout TCM 500 Turf Color Meter
  WeatherTracker Greenhouse Growth Tracker
- 2003 WatchDog WeatherTracker
  FieldScout SC 900 Soil Compaction Meter
- 2002 WatchDog Weather Station
  FieldScout TDR 300 Soil Moisture Meter
- 2001 FieldScout CM 1000 Chlorophyll Meter
- 2000 WatchDog Data Logger
- 1999 StarLogger Data Logger
  Investigator Soil Compaction Meter
  WatchDog Leaf Wetness/Temperature Logger

CE

3 Easy Ways to Contact Us!

☎ Phone

To reach us by phone, dial +01 (815) 436-4440 and speak with our knowledgeable, friendly staff about your application needs, measurement questions, or for information on local Spectrum distributors. Hablamos Español.

Online

Please come visit us online at www.specmeters.com. It's a fast and easy way to find additional information for any product. While you visit, stop by our support library for technical information, product manuals, and more.

Fax

Contact us 24 hours a day by faxing your quesitons to +01 (815) 436-4460. Be sure to include your contact information. We'll process your inquiry promptly and contact you with answers to your requests.

NUTRIENT MANAGEMENT

- **Nutrition**:
  Nutrients , Chlorophyll and pH Levels

THE IMPORTANCE OF NUTRIENT MANAGEMENT...

All crops require proper nutrient levels to maintain top quality and achieve maximum economic yield. Measure N, Na^+, K^+, chlorophyll, pH and EC to monitor nutrients in the soil and plant. Measurements can be made quickly, accurately and easily with in-field handheld meters. Immediately analyze soil or plant tissue and increase profits with well timed fertilizer applications that produce a higher quality crop.

Management solutions for:

- Nitrate, potassium and sodium monitoring
- Tissue sap sampling
- Soil and water macronutrient sampling

Cardy Potassium & Sodium Meters

Exceptionally small and portable, Cardy meters literally put the power of laboratory nutrient measurement right in your hands! The Cardy's unique, flat sensor allows you to conveniently and accurately measure small tissue and soil samples. The sensor is stored dry and is field replaceable. Accuracy correlates well with laboratory analysis with automatic range switching from 0 to 9,900 ppm.

Rated No. 1 for ease of use in an independent comparison of in-field quick tests, Cardy meters are readily endorsed by university researchers, extension personnel, soil laboratories and many other satisfied users. Each meter comes complete with carrying case, standards, accessories and a 15-sample soil test kit (except "G" models)

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Nutrient Measurement Units

Item 2400	Cardy Potassium K^+ Meter
Item 2400G	Cardy Potassium K^+ (Meter Only)
Item 2500	Cardy Sodium Na^+ Meter
Item 2500G	Cardy Sodium Na^+ (Meter Only)

Soil Kits and Accessories

Item 2434	Soil K^+ Kit w/30 Samples
Item 2535	Soil Na^+ Kit w/30 Samples
Item 2125	Sampling Sheets – 2 Rolls
Item 2135	Sampling Sheets – 4 Rolls

Standards – Replenishments

Item 2414	150 ppm K^+ DI 30 mL
Item 2418	2,000 ppm K^+ DI 30 mL
Item 2510	Solution Set – Na^+

Replacement Sensors

Item 2440	K^+ Potassium Sensor
Item 2540	Na^+ Sodium Sensor

PETIOLE POTASSIUM SUFFICIENCY LEVELS

(University of Florida)

Crop: Greenhouse Tomato

Dry Wt. Potassium - K^+	Stage
4,500 - 5,000 ppm	Transplant to second fruit cluster
4,000 - 5,000	Second cluster to fifth fruit cluster
3,500 - 4,000	Harvest season (Dec. - June)

University guidelines available for your vegetable crop at www.specmeters.com.

Nitrate Meters

Cardy Twin Nitrate Meter

Put the power of a laboratory right in your hands

NEW for 2009!

Nitrogen is essential for healthy and high yielding crops. The current cost of nitrogen fertilizers requires growers to make well educated and accurate decisions regarding when and how much nitrogen is needed. Immediate in-field testing determines how much nitrate is already present, minimizing the possibility of wasted fertilizer.

NEW FOR 2009, the newly designed Cardy Nitrate Meter is a ***waterproof***, pocket-sized meter that accurately measures samples as small as 0.3 mL. Sensor is stored dry and is easily replaceable.

Measure nutrient solutions, soils, greenhouse soilless media, water samples and tissue sap. Includes batteries, case and calibration standards.

Item 2305G	**Cardy Nitrate NO_3^- (Meter Only)**
Item 2345	**Replacement Nitrate Sensor**
Item 2311	**450 ppm NO_3^--N Standard (6 - 14 mL bottles)**
Item 2312	**34 ppm NO_3^--N Standard (6 - 14 mL bottles)**
Item 2330	**Soil NO_3^- Kit w/30 Samples**

SPECIFICATIONS FOR CARDY NITRATE METER

Measurement Principle: Ion electrode method

Sample Volume Required: 0.3 mL to 2.0 mL

Measurement Range: 14 to 1400 ppm NO_3^--N (62 to 6200 ppm NO_3^-)

Calibration (2 Point): 450 ppm NO_3^--N (2000 ppm NO_3^-)

34 ppm NO_3^--N (150 ppm NO_3^-)

Reproducibility: ± 10%

Power: CR2032 coin batteries (2)

SAMPLE GUIDELINES – (UC Davis)

Crop: Tomato

Stage	Dry Wt. Nitrate-N	Sap Nitrate-N
First bloom	10,000–14,000 ppm	700–900 ppm
1-inch fruits	8,000–9,000	500–600
First harvest	5,000–6,000	400–500
Final harvest	3,000–4,000	300–400

University guidelines available for your vegetable crop at www.specmeters.com.

Handheld Plant Sap Press

Use with Cardy meters or refractometers (page 13) for on-site testing. Made of high quality, non-corrosive metal. Cleaning device included.

Item 2725 **Hand Held Plant Sap Press**

Hydraulic Plant Sap Press

Speed up collection of large samples with our Hydraulic Plant Sap Press which provides a rapid, easy-to-use method for collecting larger samples. The press extracts sap into a collection vial. Includes plunger, grate, cylinder, expeller rod and six collection vials.

Item 2720 **Hydraulic Plant Sap Press**

Chlorophyll Meters

AE50 outstanding innovations
AWARD WINNER
FOR TECHNOLOGY
INNOVATION

Works with SpecMaps
See pages 44-45 for details

Nitrogen Management Solutions for:

- Yield-limiting crop deficiencies
- Chlorophyll monitoring
- Over-fertilization prevention

FIELDSCOUT® CM 1000 Chlorophyll Meter

Detects stress earlier than visual monitoring for healthier plant growth. Based on an exclusive patent license from NASA, the FieldScout CM 1000 Chlorophyll Meter uses "point-and-shoot" technology to instantly tell you relative chlorophyll content. At 12in(30cm), it integrates a large 1.5in(4cm) diameter area on a plant leaf or, at 4ft(1.2m), a 4.5in(11cm) diameter spot on turf grass. Laser guides outline the edges of the measured sample area of leaf or canopy. An ambient light sensor automatically corrects measurements for varying light conditions. The handheld meter calculates and displays a running average for multiple readings while simultaneously recording each sample in the built-in data logger for detailed analysis later at your PC*. Data logger can function with or without a connection to a GPS receiver**. Durable and highly portable, the FieldScout Chlorophyll Meter is an essential tool for more effectively managing your nitrogen program. Use the powerful SpecMaps online application **(pages 44-45)** to discover the value of spatially variable sensor measurements. **Mapping program requires GPS; not included.**

* Spectrum's PC cables connect to a 9-pin serial port. USB-Serial adapter (item 3661USB) required for connection to computers with only USB ports.
** GPS interface requires two cables. The GPS/DGPS cable (item 2950CV5) is available from Spectrum. A PC serial interface cable supplied by the manufacturer of the GPS receiver is also required.

Item 2950	**FieldScout CM 1000 Chlorophyll Meter**
Item 2950S	**Software To Activate Data Logger (includes PC cable)**
Item 2950CV5	**GPS/DGPS Cable**
Item 3661USB	**USB-to-Serial Adapter**

$$\text{Chlorophyll Index} = \frac{NIR}{R} \times 100$$

SPECIFICATIONS FOR FIELDSCOUT CM-1000

Measurement Sample: Plant leaves, turf grass canopy

Measurement System: Reflectance; Ambient and reflected 700 nm and 840 nm light are used to calculate the relative chlorophyll index

Measurement Area: Conical viewing area between 12 and 72in

Minimum Distance: 12in(30.5cm) from lens

Maximum Distance: Accuracy is unknown beyond 72in from lens

Distance From Lens:	Sample Area (Diameter):
12 in(30.5 cm)	0.53 in(1.35 cm)
18 in(45.7 cm)	1.21 in(3.07 cm)
48 in(1.22 m)	4.65 in(11.8 cm)

Receptor: (4) photodiodes; (2) for ambient light and (2) for reflected light from the sample (leaf)

Measurement Units: Index of relative chlorophyll content; 0 to 999

Measurement Interval: 2 seconds per measurement

Repeatability: ±5% of reading

Data Logger: Requires software and PC interface cable; Capacity: 1,350 measurements with GPS/DGPS; 3,250 measurements without GPS/DGPS; nonvolatile memory

Battery/Life: 2 AAA batteries (included); approx. 3,000 measurements

SPAD 502 & 502DL Chlorophyll Meter

SPAD 502 Chlorophyll Meters quantifies the health of your crops

The SPAD 502 Chlorophyll Meter instantly measures chlorophyll content or "greenness" of your plants to reduce the risk of yield-limiting deficiencies or costly overfertilizing. The SPAD 502 quantifies subtle changes or trends in plant health long before they're visible to the human eye. Non-invasive measurement; simply clamp the meter over leafy tissue, and receive an indexed chlorophyll content reading (0-99.9) in less than 2 seconds. Assess nitrogen needs by comparing in-field SPAD readings to university guidelines (available at www.specmeters.com) or to adequately fertilized reference strips. Research shows a strong correlation between SPAD measurements and leaf N content.

The SPAD 502 meter can be purchased with or without a built-in data logger. The data logging version (item 2900DL) allows you to compile readings for statistical analysis. Includes an RS-232 port for communicating with a PC* and/or portable GPS receiver**. Use geo-referenced data to correlate N measurements to yield maps or download the data into mapping software. This robust field-data collection device has a capacity of 1,488 measurements when coupled with a GPS receiver or 4,096 measurements when used without GPS. Requires software running on Windows 98 or higher. GPS/DGPS cable required for geo-referenced operation. Use the powerful SpecMaps online application **(pages 44-45)** to discover the value of spatially variable sensor measurements. **Mapping software requires GPS; not included.**

* Spectrum's PC cables connect to a 9-pin serial port. USB-Serial adapter (item 3661USB) required for connection to computers with only USB ports.
** GPS interface requires two cables. The GPS/DGPS cable (item 2950CV5) is available from Spectrum. A PC serial interface cable supplied by the manufacturer of the GPS receiver is also required.

Item 2900	**Minolta SPAD 502 Chlorophyll Meter** Basic version, no Data Logger
Item 2900DL	**Minolta SPAD 502DL Chlorophyll Meter** with RS-232 Data Port and Built-In Data Logger (includes software)
Item 2900DLUP	**Upgrade Field Units** to include data logger and RS-232 port (includes software)
Item 2950CV5	**GPS/DGPS Cable**
Item 3661USB	**USB-to-Serial Adapter**
Item 2900CASE	**NEW Hard Carrying Case**

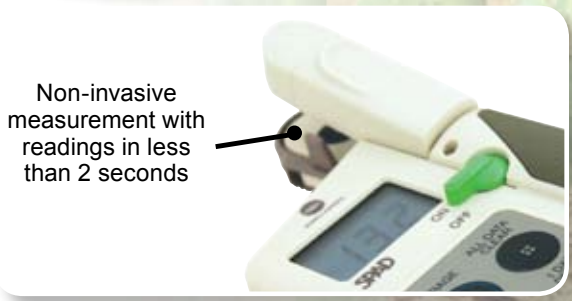
The SPAD 502 meter has been identified as the best plant diagnostic tool for nitrogen.

Blackmer, T.M., and J.S. Schepers. 1994. Techniques for monitoring crop nitrogen status in corn. Commun. Soil Sci. Plant Anal. 25:1791-1800.
Scharf, P.C. 2001. Soil and plant tests to predict optimum nitrogen rates for corn. J. Plant Nutr. 24:805-826.

SPECIFICATIONS FOR SPAD 502 & 502DL

Optical Density Difference at two wavelengths: 650 nm and 940 nm
Measurement Area: 2 mm x 3 mm (Approximately 3/32in x 1/8in)
Light Source: 2 LEDs
Receptor: Silicon Photodiode
Power Source: 2 AA alkaline batteries (1.5V)
Repeatability: Within ±0.3 SPAD unit
SPAD Value: Index of relative chlorophyll content; 0.0 to 99.9

Works with SpecMaps
See pages 44-45 for details



NDVI Meters

TCM 500 NDVI shown with optional T-Handle

Normalized Difference Vegetation Index (NDVI)

Plant stress, whether it be water, nutrient, heat, etc., detection can be difficult, especially during early stages. One indicator of plant stress is light absorption and reflectance. Since chlorophyll absorbs the red band of incoming radiation, the reflectance is relatively low due to the strong absorption of the light by the plant pigments. The high reflectance in the near infrared band is caused by the cellular structure of the plant leaves, particularly the spongy mesophyll leaf structure. When plants are under stress, red band reflectance increases due to reduced chlorophyll absorption. Near infrared band reflectance decreases due to cell structure breakdown. The normalized difference vegetation index (NDVI) is a unit of measure designed to factor both red and near infrared reflectance. NDVI measurements can range from -1 to 1, with higher values indicating greater plant health. Use NDVI measurements to schedule nitrogen applications by keeping a high nitrogen reference strip.

$$NDVI = \frac{NIR - Red}{NIR + Red}$$

Where:
NDVI = Normalized Difference Vegetation Index
NIR = reflectance in the near infrared wave band
Red = reflectance in the red wave band

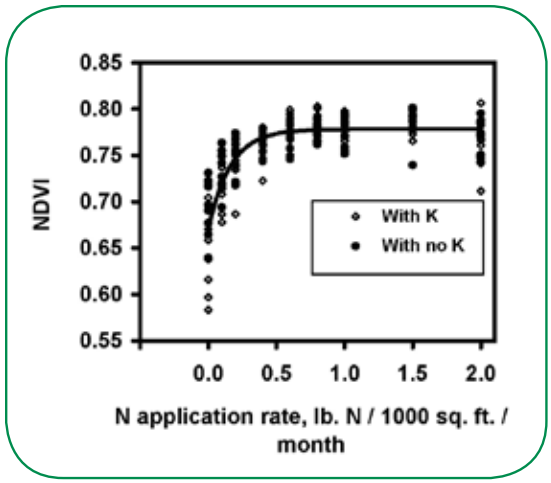


Figure 1. Normalized difference vegetation index measurements in relation to nitrogen application rate for a creeping bentgrass turf. Observations are pooled across three sample dates of established turf. Source: Dr. Karl Guillard, Dr. Salvatore Mangiafico (University of Connecticut).

(n = 162, $p < 0.0001$, pseudo-$R^2 = 0.714$). Plateau NDVI value is 0.78. Potassium treatment (K) is either 0 or 2 lb K_2O eq. / 1000 sq. ft. / month (97.8 kg K_2O eq. / ha / mo).

FIELDSCOUT® CM 1000 NDVI Meter

An essential tool for effectively managing your nitrogen program

The FieldScout CM 1000 NDVI Meter uses "point-and-shoot" technology to instantly measure reflected light in the red (660nm) and near infrared (840nm) spectral bands. Meter uses red and near infrared reflectances to calculate NDVI. At 12in(30cm), it integrates a 1.5in(4cm) diameter area on a plant leaf or, at 4ft(1.2m), a 4.5in(11cm) diameter spot on a plant. Laser guides outline the edges of the measured sample area. An ambient light sensor automatically corrects measurements for varying light conditions. The handheld meter calculates and displays a running average for multiple readings. Get greater utility with the built-in data logger for detailed analysis on your PC*. Data logger can function with or without a GPS receiver**. Durable and highly portable. Includes software.

* Spectrum's PC cables connect to a 9-pin serial port. USB-Serial adapter (item 3661USB) required for connection to computers with only USB ports.
** GPS interface requires two cables. The GPS/DGPS cable (item 2950CV5) is available from Spectrum.
A PC serial interface cable supplied by the manufacturer of the GPS receiver is also required.

Item 2953 **FieldScout CM 1000 NDVI Meter**
Item 2950CV5 **GPS/DGPS Cable**
Item 3661USB **USB-to-Serial Adapter**

FIELDSCOUT® TCM 500 NDVI Turf Color Meter

Turfgrass quality is visually evaluated by human assessors based on a scale of 1 (dead grass) to 9 (perfect grass) in the current assessment method. This evaluation practice has several disadvantages and therefore, there is the need for a better evaluation technique. Individual biases are inevitable and lead to some level of inconsistency, even among the most highly trained observers. Research from Clemson University, "Predicting Visual Quality Ratings of Turfgrass Research Plots Using Spectral Reflectance"(Muharrem, Keskin, Roy B. Dodd, Young J. Han, Ahmad Khalilian - Paper # 031114, ASAE 2003 Annual Meeting) is the basis for the technology used in this meter.

Works with SpecMaps
See pages 44-45 for details

The FieldScout TCM 500 NDVI Turf Color Meter measures reflected light from approximately a three-inch diameter section of turfgrass in the red (660nm) and near infrared (850nm) spectral bands. Using an internal light source allows the meter to negate the effect of sunny versus cloudy conditions. Data logging capability allows users to save measurements and to download to a PC*. When coupling the meter with a GPS unit**, the meter can collect geo-referenced measurements which can be used to create accurate maps of turf quality. The T-Handle option allows readings to be taken from an upright position. Data is presented as percent reflectance of red and near infrared, NDVI, and Grass Index (ie. 7.3).

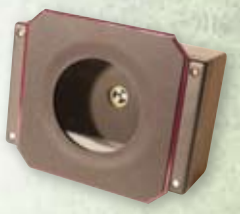
Displays Turf Color Index and NDVI on the LCD

Get greater use out of your NDVI meter with powerful SpecMaps online application **(pages 44-45)** to discover the value of spatially variable sensor measurements. **Mapping program requires GPS; not included.**

* Spectrum's PC cables connect to a 9-pin serial port. USB-Serial adapter (item 3661USB) required for connection to computers with only USB ports.
** GPS interface requires two cables. The GPS/DGPS cable (item 2950CV5) is available from Spectrum.
A PC serial interface cable supplied by the manufacturer of the GPS receiver is also required.

Item 2975NDVI **FieldScout TCM 500 NDVI Turf Color Meter**
Item 2975H **FieldScout TCM 500 T-Handle**
Item 2950CV5 **GPS/DGPS Cable**
Item 3661USB **USB-to-Serial Adapter**

AE50 outstanding innovations
AWARD WINNER FOR TECHNOLOGY INNOVATION



Internal light source makes measurements independent of outside conditions.

pH Meters

SoilStik pH Meter

pH levels are important in soils, irrigation water and spray tank water. Soil and water pH is the single most important aspect in determining nutrient availability to crops. pH levels in spray tanks determine the effectiveness of pesticides.

NEW FOR 2009, the SoilStik pH Meter's flat surface electrode measures pH in soils, semi-solids, solids and liquids. No more electrode breakage or clogged junctions. An indicator tells you when it's time to replace your electrode and when to re-calibrate the meter - which eliminates guesswork. Temporary memory recalls up to 15 sequentially tagged readings for easy recall. Automatic temperature compensated – simultaneously displays pH level and temperature of sample. Waterproof design floats in water and protects the meter in wet environments. Includes batteries, pH 4 & 7 solutions and soft case. Warranty: 1 year on meter, 6-month on sensor.

Item 2105 **FieldScout SoilStik pH Meter**
Item 2106 **Flat Sensor, Replacement**
Item 2110 **Refill Solutions - pH 4 and 7, (2) 30mL ea.**

Flat end electrode works in liquids, semi-solids and soils

SPECIFICATIONS FOR SOILSTIK pH METER

- **pH**: 0.00 to 14.00 pH
- **Temperature:** 23°F to 194°F (-5°C to 90°C)
- **Resolution**: 0.01pH, 0.1°
- **Accuracy**: ±0.01pH, ±1.8°F/±1°C
- **Power**: two 3V CR2032 button batteries
- **Dimensions**: 1.4 x 6.8 x 1.6" (35.6 x 172.7 x 40.6mm)
- **Weight**: 3.8oz (110g)

SoilStik shown in use with Item 6510, Model HC Soil Sampler (page 51)

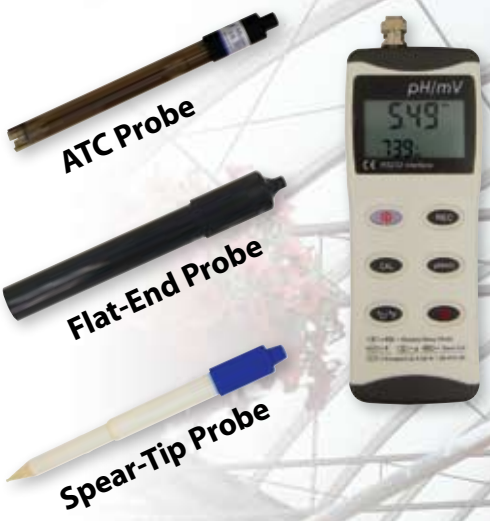
Low Soil* pH Makes Fertilizers Work Less Efficiently

SOIL ACIDITY	NITROGEN	PHOSPHATE	POTASH	FERTILIZER WASTED
Extremely Acid 4.5 pH	30%	23%	33%	71.34%
Very Strong Acid 5.0 pH	53%	34%	52%	53.67%
Strongly Acid 5.5 pH	77%	48%	77%	32.69%
Medium Acid 6.0 pH	89%	52%	100%	19.67%
Neutral 7.0 pH	100%	100%	100%	00.0%

* Mineral soils

pH/mV Meter

Spectrum's new pH/mV Meter provides an economical means for direct ground or solution pH readings using either the optional flat-tip or spear-tip probes. Backlit LCD screen displays pH level and automatic compensated temperature reading (when ATC Probe is attached). Features include automatic buffer recognition, hold function of current readings and recall of min/max readings. Includes a 9V battery, pH 4 and 7 calibration standards and hard case.
Warranty: 1 year on meter, 6-month on probe.
pH Range: 0.00-14.00(Accuracy ±0.02pH)
mV Range: -499 to 499



Item 2130	**pH/mV Meter with ATC Probe**
Item 2130M	**pH/mV (Meter Only)**
Item 2110	**Refill Solutions - pH 4 and 7, (2) 30mL ea.**
Item 2124FE	**Flat-End Probe (Soils)**
Item 2122	**Spear-Tip Probe (Soils)**
Item 2124	**ATC pH Probe (Liquids)**

IQ 150 pH Meter

Fast, easy and accurate soil pH measurement tool

A robust direct soil pH probe. The probe extends a full 6 inches in length and has a narrower point (3/16th in) which is great for small plug trays and causes less root disturbance. The sensor design allows for sampling on the side and prolongs probe life.

The IQ 150 permits instant, accurate measurement of pH in soil media as well as water or nutrient solutions. Use this portable meter for field work, food testing, soil testing, industrial applications and educational use. Probe to measure pH in growing media right on the spot, without conducting tedious soil sampling and preparation.

The IQ 150's tough, stainless steel probe stores dry. A durable ISFET silicon chip sensor eliminates problems associated with glass bulb sensors and accurately measures even a single drop. The ultra-rugged meter is armored in a water-resistant rubber holster and is engineered to withstand a 10ft(3m) drop onto concrete.

Features include recognition of 7 buffers, 0.1 or 0.01 pH resolution, automatic or manual temperature compensation and one-point or two-point calibration. Includes meter, probe, 9V battery and user's manual. **Calibration standards sold separately.** 6-month warranty on probe.

Item 2162S	**IQ 150 pH Meter with ISFET Probe**
Item 2163S	**ISFET Replacement Probe**
Item 2164S	**Field Carrying Case with pH Standards** (required)
Item 2169	**AC Adapter, 110VAC**
Item 2110	**Refill Solutions - pH 4 and 7, (2) 30mL ea.**

Simple probe design makes it easy to go from sample to sample

SPECIFICATIONS FOR IQ 150 pH METER

Power: One 9V battery (included)
pH Sensor: Stainless steel probe with silicon chip pH sensor
Range: pH – 0 – 14; mV – ±1999; Temp – 0° to 100°C
Calibration: One or two point, automatic
Accuracy/Repeatability: ±0.01 pH ± 1 digit
Auto Temp. Compensation: 0° to 100°C

View the online presentation of the IQ 150 at:

http://www.specmeters.com/iq150

pH Meters

FieldScout pH 110 shown with optional Flat End pH Probe

FIELDSCOUT® pH 110 Meter

With a built-in data logger and RS-232 port, geo-referenced pH measurements are possible in the field (soil pH) or along a river (water pH).

Every measurement is recorded until the user downloads to a PC* for analysis. A GPS interface** makes it easy to log location, generate geo-referenced soil maps, and manage pH on a site-specific basis. Growers can reduce waste, increase profits and maintain the productivity of their soil for maximum economic yields.

The FieldScout pH 110 Meter measures pH from –2.00 to 16.00 (accuracy ±0.01pH). The built-in data logger stores 4,096 readings (1,488 w/GPS). Batteries provide >50 hours use. Automatic buffer recognition allows easy calibration.

Software and PC cable* (included) allow you to download data for use in spreadsheets or mapping software. Includes hard carrying case, software with PC cable, four AAA batteries and pH 4 & 7 standards. **Electrode sold separately**.

Use the powerful SpecMaps online application **(pages 44-45)** to discover the value of spatially variable sensor measurements. **Mapping program requires GPS; not included.**

* Spectrum's PC cables connect to a 9-pin serial port. USB-Serial adapter (item 3661USB) required for connection to computers with only USB ports.
** GPS interface requires two cables. The GPS/DGPS cable (item 2950CV5) is available from Spectrum. A PC serial interface cable supplied by the manufacturer of the GPS receiver is also required.

Item 2120	**FieldScout pH 110 Meter**
	Excludes pH Electrode – order separately
Item 2121	**Combination pH/Temp Electrode**
Item 2124FE	**Flat End pH Electrode**
	For measuring the exposed surface of soil cores
Item 2950CV5	**GPS/DGPS Cable**
Item 3661USB	**USB-to-Serial Adapter**
Item 2110	**Refill Solutions - pH 4 and 7, (2) 30mL ea.**

Cardy Twin pH Meter

Ideal for testing irrigation water, pesticide water or rumen pH

pH measurements at your fingertips. Perform your own soil pH test on-site with no waiting for the lab! Test pH of irrigation water or pesticide spray water. The dual-action sensor guard protects the electrode and captures samples from buckets, lakes, streams or running water. The revolutionary flat sensor allows measurement of small samples, pastes, powders or solids.

The sensor is replaceable and stores dry. pH range: 2.0 to 12.0 (Accuracy/ Repeatability: ±0.1pH), Features include: Automatic temperature compensation, waterproof, auto power-off. Includes case, two 3V batteries and pH 4 & 7 standards.

Item 2103A	**Cardy Twin pH meter**
Item 2110	**Refill Solutions - pH 4 and 7, (2) 30mL ea.**
Item 2143	**Twin pH Replacement Sensor**

Economy pH/EC Meter

The Economy pH/EC Meter combines two essential readings for efficient crop production: pH and conductivity (EC). Conductivity of soil is an excellent indicator of nutritive salt presence. pH is an important factor in nutrient availability. Features 150-hour battery life, temperature compensation, 0.68 TDS ratio calculation, and ±0.2 pH and 2% EC scale accuracy. Includes handheld meter, calibration solution and carrying case.

Item 2182	**Economy pH/EC Meter**
Item 2183	**Replacement pH/EC Probe**
Item 2110	**Refill Solutions - pH 4 and 7, (2) 30mL ea.**
Item 2251	**Conductivity Standard, 1.41 mS/cm, 230mL**

Refractometers

Digital Refractometer

This compact refractometer offers Brix measurement from 0 to 53.0% (Accuracy ± 0.2%). The small sensor area allows measurement of minute samples. Automatic temperature compensation and a large digital display assure you get exact readings every time. Measurements display within seconds. Easy maintenance, calibrates in seconds, rinse/wipe sample area with water. Operates on two AAA batteries.

Item 2812	**Digital Refractometer**

Handheld Refractometers

Perfect for field or lab

Easily calibrated refractometers measure from 0 to 32% Brix with (Accuracy ±0.5%), with or without automatic temperature compensation. Sturdy, handheld instruments are valuable in determining Brix percentages. Simply place one or two drops of fruit or vegetable juice on the scale, then read the results in Brix through the shaded area on the eyepiece. Includes case and instructions.

Item 2801	**Refractometer 0–32% Brix**
Item 2806	**Refractometer 0–32% Auto Temp. Comp.**

EC Meters

AE50 outstanding innovations
AWARD WINNER
FOR TECHNOLOGY
INNOVATION

Exclusive Paired Sensor

FIELDSCOUT® Direct Soil EC Meter

Instant and accurate direct EC measurement

The salinity of the soil, irrigation water or fertilizer solution is an important parameter affecting the root zone environment of your plants. Any of these factors can have a significant effect on plant growth and quality. The presence of high salt levels is your warning sign to make adjustments. Don't wait for trouble, forecast before the damage shows in your plants.

The FieldScout Direct Soil EC Meter is designed with state-of-the-art sensor technology. Our exclusive paired sensor tip provides maximum soil-sensor contact and higher accuracy. Greenhouse production managers can compare readings from plant to plant, allowing for quick representative readings. Agile enough for sampling directly in plug trays, pots and containers.

Tedious soil sampling and soil preparation techniques are eliminated. With direct measurement technology, you are able to identify problems painlessly on the spot by taking several depth and position readings to give you a truly accurate picture of your plant's growing environment.

The FieldScout Direct Soil EC Meter gives you the information crucial to managing your soil EC levels with the accuracy of standard SME readings. Adjusting your irrigation and fertility programs based on this data equates to higher plant quality and increased profits.

The FieldScout Direct Soil EC Meter is your FAST, EASY and ACCURATE EC measurement solution!

Resolution 0.01 mS/cm. Accuracy ± 2%. Automatic temperature compensation. Includes case, battery and calibration standard.

U.S. PATENT NO. 7,183,779

8in(20cm) Probe Option

Item 2265FS	**FieldScout Direct Soil EC Meter w/ 8in Probe**
Item 2265PROBE	**FieldScout EC 8in Probe (Replacement)**
Item 2254	**Conductivity Standard 2.76 mS/cm**

24in(60cm) Probe Option

Item 2265FSTP	**FieldScout Direct Soil EC Meter w/ 24in T-Handle Probe and Replaceable Tip**
Item 2265FST24P	**FieldScout T-Handle EC 24in Probe w/ Replaceable Tip**
Item 2266	**Replaceable Tip For T-Handle EC Probe**
Item 2254	**Conductivity Standard 2.76 mS/cm**

FieldScout Direct Soil EC Meter w/T-Handle

view the online presentation of the Direct Soil EC Meter at:
http://www.specmeters.com/soil_ec

FIELDSCOUT EC 110 Meter

Geo-reference EC measurements with built-in data logger

The FieldScout® EC 110 combines Spectrum's patented direct-insert EC probe with a built-in data logger. Geo-reference your data by connecting a GPS receiver** to the meter's RS-232 serial port. Connection to a PC* allows you to download data for use in spreadsheets or mapping software. The FieldScout EC 110 Meter has a range of 0.00 - 199.9 mS/cm (Accuracy of ± 2%). The logger stores 1,000 readings (650 w/GPS). Four AAA batteries provide > 30 hours of use. Includes software, PC interface cable and 2.76 mS/cm calibration standard. Use the powerful SpecMaps online application **(pages 44-45)** to discover the value of spatially variable sensor measurements. **Mapping program requires GPS; not included.**

* Spectrum's PC cables connect to a 9-pin serial port. USB-Serial adapter (item 3661USB) required for connection to computers with only USB ports.
** GPS interface requires two cables. The GPS/DGPS cable (item 2950CV5) is available from Spectrum. A PC serial interface cable supplied by the manufacturer of the GPS receiver is also required.

Works with SpecMaps
See pages 44-45 for details

Item 2220	**FieldScout EC 110 Meter**
	Excludes EC Electrode - order separately
Item 2254	**Conductivity Standard 2.76 mS/cm**
Item 2950CV5	**GPS/DGPS Cable**
Item 3661USB	**USB-to-Serial Adapter**

Probe Options

Item 2220FS	**8in(20cm) FieldScout EC Probe**
Item 2225FSP	**24in(60cm) FieldScout T-Handle EC Probe w/ Replaceable Tip**
Item 2266	**Replaceable Tip For T-Handle EC Probe**
Item 2220CC	**Conductivity Cell (Water)**

Cardy Twin EC Meter

Ideal for water quality and greenhouse applications

Ultra-slim meter features push-button auto-calibration, and automatic temperature compensation. Ideal for greenhouse and field applications. The Cardy Twin EC meter's miniature sensor accurately measures even a single drop of saturated media extract. Range: 0–199 µS/cm, 0–19.0 mS/cm; Resolution: 1 µS/cm, 0.01 mS/cm (Accuracy: ±2%) and automatic temperature compensation. Includes batteries, case and solution standard.

Item 2205	**Cardy Twin EC Meter**
Item 2210	**Cardy Twin EC Refill Solution**
Item 2242	**Replacement Sensor**

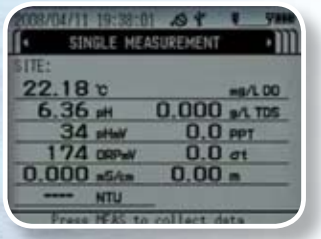
Waterproof EC Meter

A high accuracy, multi-range sensor that measures four parameters; Conductivity, TDS, Salinity and Temperature. Auto-ranging meter offers 3 ranges to measure anything from pure water to saline solution or waste, boiler and cooling water using the same conductivity cell. 6 units of measure: µS/cm, mS/cm, ppm, ppt, mg/L, and g/L. Internal memory stores up to 15 labeled readings for easy recall. Adjustable conductivity-to-TDS ratio factor (0.4 to 1.0). (Accuracy: ±2%)

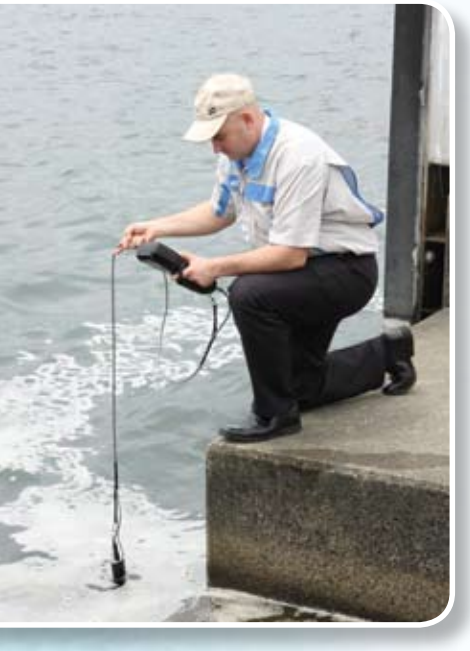
Includes conductivity cell, protective sensor cap, sample cup with cap, four SR44W button batteries, and 48in(1.2m) neckstrap. **Calibration standard sold separately.**

Item 2246	**Waterproof EC Meter**
Item 2251	**Conductivity Standard, 1.41 mS/cm, 230mL**

Water Quality



Water quality monitor displays 11 parameters simultaneously



Multi-Parameter U-50 Series Meters

Design and performance that makes measurement easy for a wide variety of applications

Simultaneously monitor, collect, and store up to 11 water quality parameters with these high-performance meters. Measured parameters include pH, ORP, dissolved oxygen, salinity, TDS, seawater specific gravity, temperature, turbidity, and water depth. The waterproof control unit is designed to be both rugged and easy to operate, making it a perfect match for fieldwork – ideal for sampling rivers, groundwater, wells, lakes, runoff / drainage, and a myriad of other ecological and agricultural applications. Refer to the chart below to help decide which model best fits your needs.

Control Unit Features:
- Easy to read, backlit display
- Display up to 11 parameters simultaneously
- Auto-calibration feature for pH, dissolved oxygen, turbidity, and depth provides hassle-free calibration
- One-hand operation
- Quick-connect connector (cable to control unit)
- Shock resistant cover
- Backlight display

Sensor Probe Unit Features:
- Ultra-sensitive turbidity sensor
- Minimum dissolved oxygen sensor maintenance with screw-on type membrane cap
- Chemical resistant materials of construction
- Field replaceable sensors

Item 2195-2	**U51-2 Meter with 2m Cable**
Item 2195-10	**U51-10 Meter with 10m Cable**
Item 2196-2	**U52-2 Meter with 2m Cable**
Item 2196-10	**U52-10 Meter with 10m Cable**
Item 2196-30	**U52-30 Meter with 30m Cable**
Item 2197-2	**U52G-2 Meter with 2m Cable**
Item 2197-10	**U52G-10 Meter with 10m Cable**
Item 2197-30	**U52G-30 Meter with 30m Cable**
Item 2198-2	**U53-2 Meter with 2m Cable**
Item 2198-10	**U53-10 Meter with 10m Cable**
Item 2198-30	**U53-30 Meter with 30m Cable**
Item 2199-2	**U53G-2 Meter with 2m Cable**
Item 2199-10	**U53G-10 Meter with 10m Cable**
Item 2199-30	**U53G-30 Meter with 30m Cable**

U-50 SERIES COMPARISON

	U-51	U-52	U52G	U-53	U-53G
pH	✔	✔	✔	✔	✔
ORP (Oxidation Reduction Potential)	✔	✔	✔	✔	✔
Dissolved Oxygen	✔	✔	✔	✔	✔
Conductivity	✔	✔	✔	✔	✔
Salinity	✔	✔	✔	✔	✔
TDS (Total Dissolved Solids)	✔	✔	✔	✔	✔
Seawater Specific Gravity	✔	✔	✔	✔	✔
Temperature	✔	✔	✔	✔	✔
Turbidity (LED)		✔	✔		
Turbidity (Tungsten lamp)				✔	✔
Water Depth			✔	✔	✔
GPS			✔		✔

Multi-Function D-54 Meter

Provides lab accuracy in a durable, in-field model

The D-54 is a multi-function pH/temperature/ORP/conductivity meter with PC/printer output capability. With a waterproof casing, automatic temperature compensation and shock/break resistant pH electrode, the D-54 is ideal for measurement in severe environments.

Includes meter, pH and conductivity electrodes, calibration standards and 9V battery.

SPECIFICATIONS FOR D-54 PH/EC Meter

Range: pH - 0 - 14
Conductivity: 1µS/cm to 100 mS/cm mV — ±1999
Calibration: pH — one to three points automatic
Accuracy/Repeatability: ±0.01 pH ± 1 digit
Conductivity: ±0.05% ES or EC
Auto Temp Compensation: 0° to 100°C

Item 2172 **D-54 pH/EC Meter System**
Item 2173 **pH Electrode Replacement**
Item 2174 **Conductivity Electrode Replacement**

ORP Meter

ORP (oxidation reduction potential, also known as redox) measurement is used to indicate the presence of oxidizing or reducing conditions in water. This technology has gained recognition worldwide and is found to be a reliable indicator of bacteriological water quality.

Some applications for ORP or redox measurement include chlorine testing, bleaching operations, estimation of bacteria kill times, or reduction of chromate wastes. For example: with a value of 600mV, the life of E.Coli in water is about 2 minutes; with a value of 700, the bacteria is killed in seconds.

This handheld ORP meter is designed for the field, combining accurate electronics and a rugged, field-ready design.

Features:

- ORP measurement from -999 to 999mV with a resolution of 1mV, +/-4mV accuracy.
- Automatic electronic self-calibration and data validation.
- Simulated analog bargraph display of ORP reading change.
- Waterproof floating case

Item 2010 **ORP Meter**
Item 2011 **ORP Replacement Sensor**

Water Quality

Dissolved Oxygen Meter

This heavy duty meter provides a dual display of oxygen concentration and temperature and is an ideal tool for in-field and laboratory water monitoring requirements, including industrial and municipal waste water, aquariums, fish hatcheries, and other environmental applications.

The meter also monitors oxygen in air for indoor air quality and confined space applications. Features automatic temperature compensation. Both oxygen and temperature readings are simultaneously displayed.

Features:
- Measures dissolved oxygen, oxygen, and temperature
- Min/Max/Avg, Data Hold, Auto Power Off
- Automatic Temperature Compensation
- Large 1.4" (36mm) LCD display
- Built-in RS-232 PC interface with optional Data Acquisition Software and Datalogger

The Heavy Duty Dissolved Oxygen meter comes with a polarographic probe with a built in temperature sensor, battery, spare membranes, and electrolyte - all in a hard carrying case ready for in-field dissolved oxygen testing.

2005	**Dissolved Oxygen meter**
2007	**Replacement Membrane for DO meter (5 per pack)**
2008	**Replacement KCl Solution**

Waterproof Chlorine Meter

Fast and easy to use, and a great alternative to the messy powders currently being used with color dependent meters. Simply drop a reagent tablet into your solution, shake to dissolve, and then insert your meter for direct measurements.

Designed with a waterproof, rugged housing and flat surface electrode that can withstand harsh environments while offering lab precision accuracy-no matter where you take your readings. Unlike colorimeters, the revolutionary new direct measurement technique takes quantitative measurements — which means it is not effected by light, scratched vials, color or turbidity of samples. Specially designed to eliminate error factors to give you precise readings wherever a measurement is needed.

Item 2015	**Waterproof Chlorine Meter**
Item 2016	**Reagent Tabs - 10pk (100 tests)**
Item 2017	**Chlorine Standard - 1ppm - 3 ampules**

PESTS AND DISEASES

- **Pest and Diseases:**
  Insects, Diseases and Nematodes

THE IMPORTANCE OF PEST AND DISEASE MANAGEMENT...

Pests and diseases can reduce plant quality and yield. Protect your plants by submitting environmental conditions to disease and insect models. These models forecast disease and insect pressure using field-tested and validated algorithms. Forecasts can assist pesticide application timing, facilitate an IPM approach and improve plant health.

IPM Scope

TOP 10 New Products of 2006 World Ag Expo

Portable digital microscope solution at an affordable price

The IPM Scope combines a digital camera, precision optics and LED lighting into a powerful handheld microscope and imaging software package. Zoom in on fine details of plant disease symptoms, or insects. Instead of straining to look into a tiny eyepiece, place the IPM Scope over the leaf and view the magnified image right on your computer screen. The IPM Scope comes with all the software required to capture and archive your still images. The video software upgrade provides the ability to capture live videos and time lapse sequences of insect movement. The IPM Scope connects to your computer's USB port and it is ready to use anywhere.

IPM Scope shown with optional Plastic Horseshoe to view 3D images

Features:
- View live images on the computer screen
- Measures 40X and 140X magnification
- Completely portable when connected to a laptop computer
- Archive still images or send files via e-mail
- Add labels, markers, time stamps and measurement scale
- Draw directly on the live image

Item 2860	**IPM Scope**
Item 2860V	**Video Software Upgrade**
Item 2860UV	**IPM Scope-Ultra Violet**
Item 2860MP	**IPM Scope-Mega Pixel**
Item 2860HS	**Plastic Horseshoe-3D images**

SPECIFICATIONS FOR IPM SCOPE

Image Sensor: 1/3" CMOS	**Pixels:** 640 x 480
Power: USB Port	**Light Source:** Super-bright LEDs
Field of View: @40X: 7.5 x 10 mm @140X: 1.8 x 2.5 mm	**Resolution:** 4 microns

Gregg A Blew CGCS
Golf Course Superintendent
Wellshire Golf Club

view the online presentation of the IPM Scope at:
http://www.specmeters.com/ipm_scope

Macroscope

MACROSCOPE 25 provides 25X magnifications over a wide 5mm (3/16) field of view. The positionally correct image includes an interchangeable scale. The A scale provides measurements in millimeters and the B scale provides measurements in inches. Unit can be used for distance viewing when close-up lens is removed.

MACROSCOPE 45 provides 45X magnification over a wide 3mm (2/16) field of view. It incorporates a measuring scale providing measurements in inches or millimeters. Unit can be used for distance viewing when close-up lens is removed.

Item 2851	**Macroscope 25 with hard carrying case**
Item 2852	**Macroscope 45 with hard carrying case**

ENVIRONMENT

- **Environment**:
  Temperature, Light, Rain, Relative Humidity and Leaf Wetness

THE IMPORTANCE OF ENVIRONMENT MONITORING...

Weather plays a key role in plant health. Keep your crops healthy and happy by staying on top of local level weather conditions. Use customized set-ups to monitor different areas to determine and manage microclimates. Measure key parameters such as air temperature, relative humidity, rainfall, wind speed and wind direction, plus you can add additional sensors to customize your unit. Data log environment information at user-defined intervals and run detailed reports to make informed decisions.

Take monitoring one step further by adding a disease and insect package. Use additional parameters such as leaf wetness to determine when the conditions are right for a particular disease.

WatchDog® 2000 Series Weather Stations

The affordable, customizable solution for growers, consultants, researchers or anyone who deals with weather conditions as part of their job. Monitor over a dozen important growing conditions for effective crop and pest management. Stations have 12-bit accuracy and resolution, and waterproof external sensor ports. Easily view real-time weather or historical data with Spectrum's exclusive LCD display. **See pages 22-23**

WatchDog® 2000 Series Mini Weather Stations

Sharing the power, flexibility and accuracy of the 2000 Series Weather Stations, the 2000 Series Mini Stations provide an affordable solution for logging four channels of weather sensor values. Mini Stations are ideal for monitoring microclimates or where increased sensor capacity and wind speed and direction are not required. Easily view real-time weather, severity indicators from onboard plant disease models or historical data with Spectrum's exclusive LCD display. **See pages 24-25**

WatchDog® 200/400 Series Data Loggers and Mini Weather Stations

The perfect choice for soil moisture monitoring, disease forecasting or other applications where a complete weather station isn't necessary. Mix and match the best combination of loggers and sensors to meet your budget and needs. **See page 30**

WatchDog® 100 Series Economy Loggers

Ideal for measuring one or two parameters. Small size, low per-unit cost, and robust, weather-resistant design make the economy loggers ideal for a variety of measurement applications. **See page 31**

WatchDog® Sprayer Station

Monitor and data log weather conditions with the ultrasonic WatchDog Sprayer Station: the compact all-in-one weather station that measures air temperature, humidity, dew point, wind chill, barometric pressure and apparent wind speed and direction. While on-the-go, the station uses its internal compass and GPS to compute the true wind speed and direction. **See pages 36-37**

WatchDog® Product Line

REFERENCE:

✔ STANDARD
OPT OPTIONAL
BLANK NOT AVAILABLE

STANDARD FEATURES | OPTIONAL SENSORS & ACCESSORIES

Item #	Model	Evapotranspiration **ET**	LCD Display **LCD**	Wireless	Alarm Output-Ready **Alrm** 3672	Air Temperature Sensor **Tmp**	Relative Humidity Sensor **RH**	Dew Point **Dew**	Wind Speed and Direction **Wind**	Tipping Bucket Rain Collector **Rain** 3665R	Solar Radiation Sensor **Solar** 3670I	Avaliable Sensor Ports	Quantum Light Sensor **PAR** 3668I	Ext.(Soil) Temperature Sensor **Temp** 3667	Leaf Wetness Sensor **LW** 3666	Watermark Soil Moisture **SM** 6450WD	Barometric Pressure Sensor **Bar** 3671
Weather Stations (prepackaged units with LCD display, external sensor ports, and wireless communication options)																	
3350WD2	2900ET	✔	✔	OPT	✔	✔	✔	✔	✔	✔	✔	5	OPT	OPT	OPT	OPT	OPT
3345WD2	2800		✔	OPT	✔					OPT	OPT	9	OPT	OPT	OPT	OPT	OPT
3340WD2	2700		✔	OPT	✔	✔	✔	✔	✔	✔	OPT	6	OPT	OPT	OPT	OPT	OPT
3320WD2	2550		✔	OPT	✔	✔	✔	✔	✔		OPT	6	OPT	OPT	OPT	OPT	OPT
2000 Mini Station (affordable 4 channel datalogging units, featuring LCD display and wireless communication options)																	
3684WDPD	Plant Disease Station		✔	OPT	✔	✔	✔	✔		✔		0			✔		
3686WD	2475		✔	OPT	✔	✔	✔	✔		OPT	OPT	1	✔	OPT	OPT	OPT	OPT
3684WD	2450		✔	OPT	✔	✔	✔	✔		OPT	OPT	2	OPT	OPT	OPT	OPT	OPT
3683WD	2425		✔	OPT	✔	✔				OPT	OPT	3	OPT	OPT	OPT	OPT	OPT
3685WD	2400		✔	OPT	✔					OPT	OPT	4	OPT	OPT	OPT	OPT	OPT
200-400 Series Data Loggers (mix and match components for affordable 2-4 channel datalogging units featuring LCD display)																	
3685SM	Irrigation Station		✔							OPT		1		OPT		✔ (3)	
3680SM	Irrigation Station		✔									0				✔ (2)	
3684PDSR	Plant Disease Station		✔			✔	✔	✔		✔		0			✔		
3684	450		✔			✔	✔			OPT	OPT	2	OPT	OPT	OPT	OPT	
3683	425		✔			✔				OPT	OPT	3	OPT	OPT	OPT	OPT	
3685	400		✔							OPT	OPT	4	OPT	OPT	OPT	OPT	
3682	250		✔			✔	✔					0					
3681	225		✔			✔				OPT	OPT	1	OPT	OPT	OPT	OPT	
3680	200		✔							OPT	OPT	2	OPT	OPT	OPT	OPT	
100 Series Economy Loggers (economic datalogging units for 1-2 parameters)																	
3610TLW	130 Leaf Wetness/Temp Station					✔						0			✔		
3554WD	120 Data-Logging Rain Gauge									✔		0					
3617WDRS	125 Soil/Air Temp Station					✔						0		✔			
3635WD	115 Rain Logger									OPT		1					
3612WD	150					✔	✔					0					
3617WD	125					✔						0		✔			
3618WD	110					✔						0					
3621WD	Button 100-T/RH					✔	✔					0	(requires item 3655K Docking Station)				
3620WD	Button 100-8K					✔						0	(requires item 3655K Docking Station)				
3619WD	Button 100-2K					✔						0	(requires item 3655K Docking Station)				
Wireless Crop Monitor (a base station with 1-16 wireless remote sensor units, ideal for greenhouse or frost monitoring)																	
3540	T/RH		✔	✔		✔	✔					0					
3545	Temp		✔	✔		✔						1	OPT	OPT	OPT		
Mobile Sprayer Station (a compact unit providing on-the-go weather monitoring)																	
3349SSC			✔			✔	✔	✔	✔			0					✔

ENVIRONMENT

WatchDog® 2000 Series Weather Stations

AE50 outstanding innovations
AWARD WINNER
FOR TECHNOLOGY INNOVATION

Model 2900ET

Professional grade solutions for:

- Early pest/disease forecasting
- Efficient irrigation management
- Microclimate and field research

Why base your important growing decisions on distant university or airport weather reports? WatchDog 2000 Series Weather Stations deliver accurate, real-time weather information directly from your orchard or vineyard. Together with Spec 9 Pro software, you can monitor, record and analyze over a dozen important growing conditions for more effective and profitable crop and pest management.

Built-in data logger - Store your measurements in fail-safe, non-volatile memory until you transfer the data to your PC. Select measurement intervals from 1 to 60 minutes. With a 30 minute interval, the station will retain 183 days of data. Downloading data will not erase it from the station, so multiple PCs can access the station without impacting a master data collection plan.

Enhanced LCD Display - **A WatchDog exclusive**. Check current and daily high/low readings for the past 30 days or confirm the station and sensors are performing — without connecting to a PC.

Battery powered - A 12-month battery power source (four AA alkaline batteries included) means no solar panels to purchase and maintain. WatchDog 2000 Series Weather Stations use state-of-the-art electronics with low power consumption.

Communication options - Suit your specific needs by choosing from direct connection, wireless, cellular or other data transfer options **(see pages 26-27).**

Customize your station - With plug-in sensors. Over a dozen sensors, such as leaf wetness, soil moisture or temperature are available **(see pages 28-29).**

WATCHDOG WEATHER STATION FEATURES

Sensors	Wind Speed	Wind Direction	Air Temp	Relative Humidity	Rainfall	Solar Radiation	External Sensor Ports
Model 2900ET	✔	✔	✔	✔	✔	✔	5
Model 2700	✔	✔	✔	✔	✔	Opt.	6
Model 2550	✔	✔	✔	✔	N/A	Opt.	6
Model 2800	N/A	N/A	Opt.	N/A	Opt.	Opt.	9

Specifications	Accuracy
Wind Direction: 0° increments	±4°
Wind Speed: 0, 2 to 150 mph(0, 3 to 241 km/h)	±2 mph(±3 km/h) , ±5%
Temperature: -25° to 212°F(-32° to 100°C)	±1°F(±0.6°C)
Humidity (Models 2550, 2700, 2900ET): 10% to 100% @ 5° to 50°C	±3%
Dew Point (Models 2550, 2700, 2900ET): -99° to 140°F(-73° to 60°C)	±4°F(±2°C)
Rainfall (Models 2700, 2900ET): 0.01" (0.25mm)	±2%

SpecWare Pro software required.

Customize Your Station with These Accessories

External Sensors
From light sensors to soil moisture sensors, we have the tools to keep your weather station's eyes on your requirements.

See pages 28-29

Wireless Connectivity
Let your WatchDog be heard; track its data from wherever you need to be.

See pages 26-27

Software & Disease Models
Our award winning SpecWare software and disease models help you make decisions based on your Weather Station data.

See pages 34-35

WatchDog 2000 Series Data Shuttle
Transport your weather data to your host PC. Memory holds data from up to 8 full 2000 Series Mini Stations or 5 full Weather Stations. Not for 400/200 Data Loggers.

Item 3679WD

WatchDog Model 2900ET

The most powerful package for optimizing your irrigation and IPM decisions

Optimize your irrigation and IPM programs with this powerful weather station. The comprehensive water management system enables you to assign discrete K-factors to each crop/field you track for evapotranspiration and irrigation amounts. **Requires SpecWare Pro software (see pages 34-35)**.
The WatchDog Model 2900ET measures, calculates and logs:

- Evapotranspiration (ET_o)
- Rainfall
- Solar radiation
- Relative humidity
- Wind speed and direction
- Dew point
- Air temperature
- Up to 5 external sensors

Item 3350WD2 **WatchDog 2900ET Weather Station**

Exclusive LCD display

WatchDog Model 2700

The WatchDog 2700 Station is an affordable and versatile solution for growers, researchers and consultants. **Requires SpecWare Pro software (see pages 34-35)**.
The WatchDog 2700 measures, calculates and logs:

- Wind speed & direction
- Dew point
- Relative humidity
- Air temperature
- Rainfall
- Up to 6 external sensors

This versatile station offers all of the features of the 2900ET except for evapotranspiration and solar radiation.

Item 3340WD2 **WatchDog 2700 Weather Station**

Model 2700

WatchDog Model 2550

Ideal for fast, on-demand deployment or temporary installations such as hazmat or pesticide application. Measure wind speed/direction, temperature, RH, dew point and up to six external sensors. **Requires SpecWare Pro software (see pages 34-35)**.

Item 3320WD2 **WatchDog 2550 Weather Station**

Model 2550

WatchDog Model 2800

The WatchDog 2800 Station is ideal where multiple sensor measurements are required for temperature, soil moisture, crop canopy light or leaf wetness data. Customize the station to your application by choosing up to eight plug-in sensors, plus one optional rainfall sensor. The 2800 Station features the same memory, power source and LCD as other WatchDog stations, and accepts the same communication devices and sensors. **Requires SpecWare Pro software (see pages 34-35)**

Item 3345WD2 **WatchDog 2800 Weather Station**

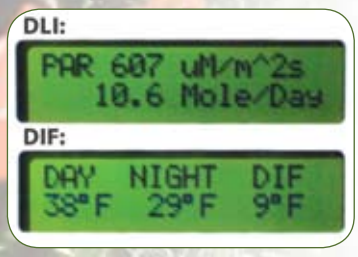
Model 2800

ENVIRONMENT

WatchDog® 2000 Series Mini Stations

AE50 outstanding innovations
AWARD WINNER
FOR TECHNOLOGY
INNOVATION

Model 2475



Exclusive LCD display on all 2000 Series Mini Stations

Professional grade solutions for:

- Plant growth monitoring
- Early pest/light forecasting
- Efficient irrigation management
- When wind speed/direction isn't needed

With the same power, flexibility, and accuracy as the 2000 Series Weather Stations, the 2000 Series Mini Stations provide an affordable solution for logging four channels of weather sensor values. With a wide selection of sensors and wireless communications options, the Mini Stations are ideal for monitoring microclimates, or where the increased sensor capabilities of the Weather Stations are not required. The NEMA-4 type IP 66 enclosure and weatherproof connectors provide greater reliability in harsh outdoor environments. **SpecWare software required.**

Built-in data logger - Store your measurements in fail-safe, non-volatile memory. Select measurement intervals from 1 to 60 minutes. With a 30 minute interval, the station will retain 198 days of data. Downloading data will not erase it from the station, so multiple PCs can access the station without impacting the master data collection plan and acquire a complete set of data.

Flexible Sensor Options - Add 1-4 external sensors to your Mini Station to record the parameters you need. **See pages 28-29 for a wide range of sensors.**

Enhanced LCD Display - **A WatchDog exclusive**. Check current conditions and high/low readings for the past 30 days or last 12 months. Confirm the station and sensors are performing - without connecting to a PC. Select Spec 9 Pro disease models can run on the station, providing field viewing of disease severity indicators.

Battery powered - A 12-month battery power source (four AA alkaline batteries included) means no solar panels to purchase and maintain. WatchDog Mini Stations use state-of-the-art electronics with low power consumption.

Alarms - With the optional alarm module **(page 28)** or through Spec 9 Pro software, send a warning if a sensor exceeds high and low limits.

Communication options - Suit your specific needs by choosing from direct connection, wireless, cellular or other data transfer options. **See pages 26-27 for details.**

Customize Your Station with These Accessories

External Sensors
From light sensors to soil moisture sensors, we have the tools to keep your weather station's eyes on your requirements.

See pages 28-29

Wireless Connectivity
Let your WatchDog be heard; track its data from wherever you need to be.

See pages 26-27

Software & Disease Models
Our award winning SpecWare software and disease models help you make decisions based on your Weather Station data.

See pages 34-35

WatchDog 2000 Series Data Shuttle
Transport your weather data to your host PC. Memory holds data from up to 8 full 2000 Series Mini Stations or 5 full Weather Stations. Not for 400/200 Data Loggers.

Item 3679WD

WatchDog Model 2475 Plant Growth Station

PAR light intensity, Daily Light Integral, day/night average temperatures, degree days and more! The Plant Growth Station monitors and records temperature, humidity, dew point and light conditions anywhere in your greenhouse. Easily check current conditions and up to twelve months of historical data on the LCD display. Calculate DLI to adjust your shade and light hours. Supports one external sensor. **Requires SpecWare software (see pages 34-35)**.

Item 3686WD **WatchDog Model 2475 Plant Growth Station**

WatchDog Model 2450 Temperature/RH Station

Measure air temperature, relative humidity and dew point. Supports two external sensors. **Requires SpecWare software (see pages 34-35)**.

Item 3684WD **WatchDog 2450 Temperature/RH Station**

WatchDog Model 2425 Temperature Station

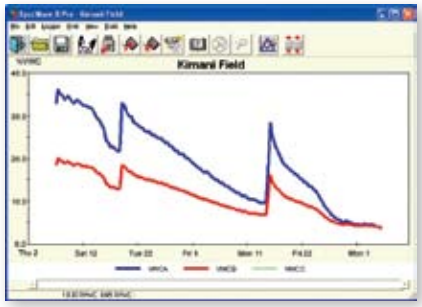
Measure air temperature and supports up to three external sensors. **Requires SpecWare software (see pages 34-35)**.

Item 3683WD **WatchDog 2425 Temperature Station**

WatchDog Model 2400 External Sensor Station

The WatchDog 2400 Station is ideal where multiple sensor measurements are required for temperature, soil moisture, crop canopy light or leaf wetness data. Customize the station to your application by choosing up to four plug-in external sensors (if you require more than four sensors, consider the 2800 Weather Station on page 21). **Requires SpecWare software (see pages 34-35)**.

Item 3685WD **WatchDog 2400 External Sensor Station**

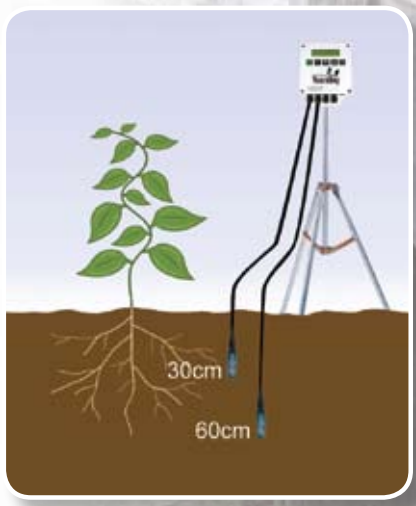


SpecWare Pro showing data from two WaterScout SM 100 sensors at different depths.

"My farm manager is particularly grateful not to have to go back to a wired solution since he would have needed to trench in the wire! We have been using the device daily for frost forecasting and all is going well."

Carolyn DeMoranville
Cranberry Station
University of Massachusetts-Amherst

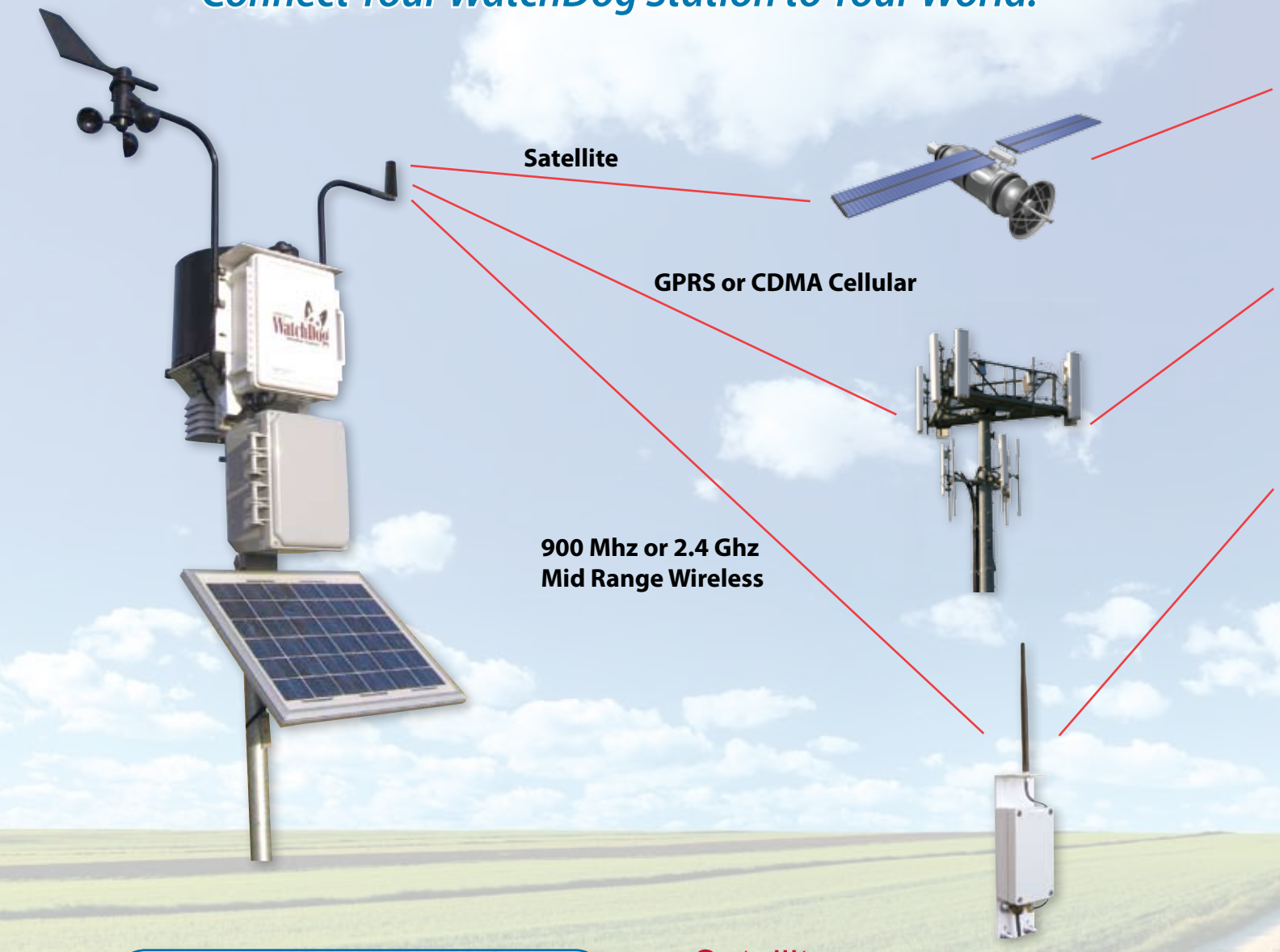
Model 2425
with wireless option



WatchDog Model 2400 shown with two WaterScout SM 100 Soil Moisture Sensors. **See page 32**

WatchDog® Wireless Options

Connect Your WatchDog Station to Your World!



Let us configure a WatchDog communication system that meets your needs - Call us today

Satellite

The WatchDog Satellite communications system gets your weather data to the web - anywhere there's sky.

Item 3388S WatchDog Comm Satellite

GPRS or CDMA Cellular

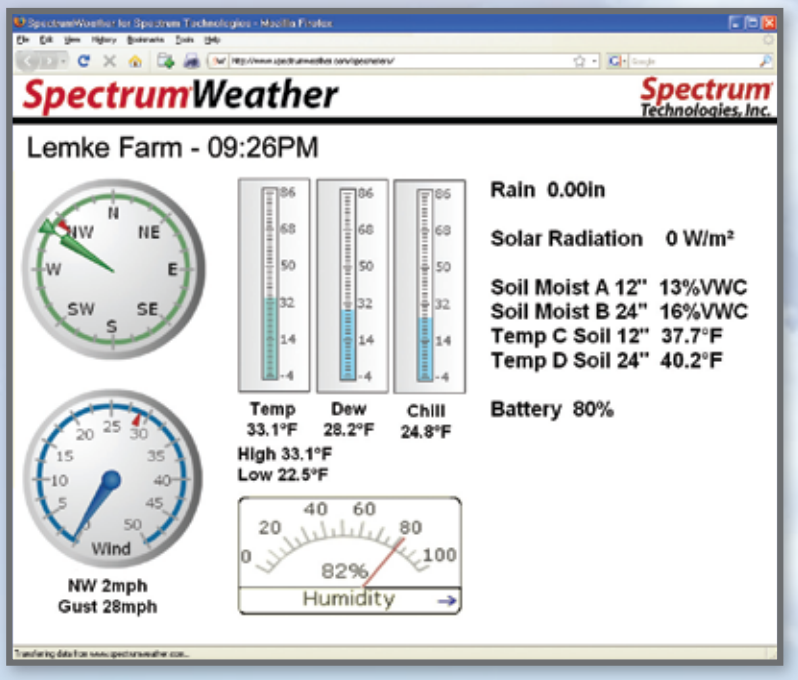
If you can talk on your cell phone, your weather data can reach the web from where you grow.

Item 3388G WatchDog Comm GPRS
Item 3388C WatchDog Comm CDMA

900 Mhz or 2.4 Ghz
Mid Range Wireless

Send your data to the web using spread-spectrum wireless to a network-attached base station and avoid recurring transmission charges.

Item 3391LAN Wireless Base LAN



Or send data to your server!

SpectrumWeather

Coming in March 2009!

View your current conditions from anywhere there's web access. Interface with SpecWare 9 Pro for reports and analysis.

Wireless - Direct to your PC

Short Range Wireless - up to 1,000ft(300m)

Spend less time retrieving data from your weather stations. Connect your PC to one or more remote weather stations up to 1,000 feet away. Set it up indoors, or head for the fields in your vehicle with your laptop, base station, and optional power adapter for "drive-by wireless". The base station includes a 6ft serial cable, and connectors for a standard cat-5 cable to extend up to 50ft from the PC. The remote radio mounts within the station's enclosure for greater protection and ease of field implementation. Remote radios include whip antenna, solar panel and rechargeable batteries.

Item 3392B	Short Range Wireless Base Station
Item 3392W	Short Range Wireless For Remote Weather Station
Item 3392M	Short Range Wireless For Remote Mini Station
Item 3392PA	Vehicle Power Adapter

Mid Range Wireless - up to 2 miles(3km)

Experience the advantages of real-time weather information by connecting your 2000 Series Remote Weather Stations to a PC up to 2 miles(3km) away. The base station features a weatherproof case and 50ft(15m) cable to allow high mounting for the greatest range. Remotes include whip antenna, solar panel and rechargable batteries.

Item 3391B	Mid Range Wireless Base Station
Item 3391W	Mid Range Wireless For Remote Weather Station
Item 3391M	Mid Range Wireless For Remote Mini Station

Optional Yagi antennas increase line of sight range to 7 miles(11km)

Item 3390YAGI8	8.2 DBi Yagi Antenna (cable required)
Item 3390CABLE10	Yagi Antenna Cable -10ft(3m)
Item 3390CABLE20	Yagi Antenna Cable -20ft(6m)

WatchDog® Sensors and Accessories

Customize Your Stations and Loggers!

UV Light Sensor
Measure UV radiation between 250-400 nanometers.

Item 3676I

Silicon Pyranometer Sensor
Measure solar radiation between 300-1100 nanometers.

Item 3670I

Barometric Pressure Sensor*
Standard - Item 3671

High Altitude - Item 3671M

CO_2 Sensor
Measure CO^2 levels in ppm using NDIR technology.

Item 2655

Replacement RH Sensor
Replace your RH Sensor and return to like-new accuracy.

For Weather Stations
Item 3612RHS

For Data Loggers
Item 3612RHB

Quantum Light Sensor
Measure PAR light between 400-700 nanometers.

Item 3668I

Infrared Temperature Sensor*
Measure and log leaf temperatures without disturbing your plants.

IR Temp Sensor - Solar Power
Item 3676S

IR Temp Sensor - Basic
Item 3676B

Temperature (Micro) Sensor
Measure surface temperature of leaves and other applications.

Item 3667S

3 or 6 Sensor Quantum Bar
Average PAR readings to minimize the effects of small shadows.

3 Sensor Bar - Item 3668I3

6 Sensor Bar - Item 3668I6

Tipping Bucket Rain Collector
Measure rainfall in 1/100in. increments. Self-emptying, freeze resistant.

Item 3665R

Irrigation On/Off Sensor
Record and analyze relationships between irrigation periods and soil moisture.

Item 6451

Leaf Wetness Sensor
Measure leaf wetness with grid-like, resistance-based sensor.

Item 3666

Watermark Soil Moisture Sensor
Measures soil moisture tension from 0 to 200 centibars.

Sensor with 11ft(3.3m) cable
Item 6450WD

Sensor with 25ft(7.6m) cable
Item 6450WD20

Pressure Transducer
Adapts to Irrometer tensiometers and allows use of the dial gauge for measurements.

Item 3669

Extension Cable
20ft extension for all sensors.

Item 3664

External (Soil) Temperature Sensor
Measure soil, air, or water temperature with a resistance-based sensor.

Sensor with 6ft(1.8m) cable
Item 3667

Sensor with 20ft(6.1m) cable
Item 3667-20

WaterScout™ SM 100 Soil Moisture Sensor*
Measures soil moisture (VWC) with little or no distrubance to the root zone. **See page 48**

Sensor with 6ft(1.8m) cable
Item 6460

Sensor with 20ft(6.1m) cable
Item 6460-20

Tripod Mount*
Rugged folding galvanized steel tripod.

Item 3396TP

Alarm Output Module*
Trigger external device based on a sensor reading.

Item 3672

*** Not for 400/200 data loggers.**

WatchDog® Sensors and Accessories

REFERENCE:

✔ AVAILABLE ON MODEL
BLANK NOT AVAILABLE

	Sensors	Description	Weather Stations	2000 Mini Stations	200-400 Series Data Loggers	Range / Resolution*	Accuracy*
Soil Sensors	6460	WaterScout Soil Moisture Sensor 6ft(1.8m)	✔ **	✔ **		0 to saturation (typically 50%)	±3%
	6460-20	WaterScout Soil Moisture Sensor 20ft(6.1m)	✔ **	✔ **		0 to saturation (typically 50%)	±3%
	6450WD	Watermark Soil Moisture Sensor 11ft(3.3m)	✔	✔	✔	0 to 200 centibars	
	6450WD20	Watermark Soil Moisture Sensor 25ft(7.6m)	✔	✔	✔	0 to 200 centibars	
	3669	Tensiometer Pressure Transducer	✔	✔	✔		±2%
	6450ADPT	Watermark Adapter	✔	✔	✔		
	6452ADPT	ECH$_2$O Adapter	✔	✔			
	6451	Irrigation On/Off Sensor	✔	✔	✔	On at 5psi	
	3667	External (Soil) Temperature Sensor 6ft(1.8m)	✔	✔	✔	S: -25 to 212°F(-32 to 100°C)	±1°F(±0.6°C)
	3667-20	External (Soil) Temperature Sensor 20ft(6.1m)	✔	✔	✔	L: -4 to 158°F(-20 to 70°C)	±1°F,(±0.6°C)
	3667S	Temperature (Micro) Sensor	✔	✔	✔		
	3676S	Infrared Temperature Sensor - Solar Power	✔	✔		32 to 212°F(0 to 100°C)	±1.3°F(±0.7°C)
	3676B	Infrared Temperature Sensor Basic	✔	✔		32 to 212°F(0 to 100°C)	±1.3°F(±0.7°C)
	3665R	Tipping Bucket Rain Collector	✔	✔	✔	0.01", 0.25mm	±2%
	3666	Leaf Wetness Sensor	✔	✔	✔	0 (dry) to 15 (wet)	
	3671	Barometric Pressure Sensor	✔	✔		26 to 32inHg, 880-1080hPa	±0.05inHg, ±1.7hPa
	3671M	Barometric Pressure Extended Range	✔	✔		18.75 to 33.1inHg, 635-1121hPa	±0.057inHg, ±1.9hPa
	2655	CO2 Sensor	✔	✔	✔	0-4000ppm	±5% or 50ppm
	3612RHS	Replacement RH Sensor for Weather Stations	✔	✔		10 - 100% at 5 - 50°C	±3% RH
	3612RHB	Replacement RH Sensor for Data Loggers			✔	20 - 100% at 5 - 50°C	±3% RH
Light Sensors	3668I	Quantum Light Sensor	✔	✔	✔	0-2500 µmol m^{-2} s^{-1}	±5%
	3668I3	3 Sensor Quantum Bar	✔	✔	✔	0-2500 µmol m^{-2} s^{-1}	±5%
	3668I6	6 Sensor Quantum Bar	✔	✔	✔	0-2500 µmol m^{-2} s^{-1}	±5%
	3676I	UV Light Sensor	✔	✔	✔	0-200 µmol m^{-2} s^{-1}	±5%
	3670I	Silicon Pyranometer Sensor	✔	✔	✔	0-1250 W/m^2	±5%
	3673	Voltage Input Cable	✔	✔	✔	S: 0-3.0V, L: 0-2.54V, 1mA	S: ±0.005V, L: ±0.02V
	3674	4-20mA Input Cable	✔	✔	✔	0-20.1mA	±1%
	3664	Extension Cable 20ft(6.1m)	✔	✔	✔		
						* S=Stations, L=Loggers	
	Connectivity						See pages 26-27
	3392B	Short Range Wireless Base Station	✔	✔			
		Short Range Wireless Remote Radio	3392W	3392M		Up to 1,000 Feet(300 Meters)	
	3391B	Mid Range Wireless Base Station	✔	✔			
		Mid Range Wireless Remote Radio	3391W	3391M		Up to 2 Miles(3 Kilometers)	
	3679WD	WatchDog 2000 Series Data Shuttle	✔	✔			
	3679	WatchDog Data Shuttle			✔		
	3661USB	USB-to-Serial Adapter	✔	✔	✔		
	3365WD	Short Range Modem Pair	✔	✔			
	3668-75SP	Direct PC Connection 75ft(22.8m) Cable	✔	✔			
	3387WD96	Dial-up Modem	✔	✔			
	Miscellaneous						See page
	3654P	Spec 9 Pro Software	✔	✔	✔		34
	3654B	Spec 9 Basic Software		✔	✔		34
	3658	Sliding Enclosure			✔		30
	3663	Radiation Shield			✔		30
	3396TP	Tripod Mount	✔	✔			28
	3672	Alarm Output Module	✔	✔			28
	3419	AutoDialer	✔	✔			39

** WatchDog Stations sold prior to 2009 must be upgraded for the WaterScout.

WatchDog® 400/200 Series Data Loggers

Actual size

Affordable and Versatile

WatchDog® Data Loggers

Data Loggers are the cost-effective choice for recording environmental conditions over a period of time. Whether your needs are plant disease alerts or soil moisture monitoring, the award-winning WatchDog Data Logger will deliver the information you need for timely, accurate data that will result in increased profits. **Requires SpecWare software (see pages 32-33) and mini radiation shield.**

WatchDog® 400/200 Series Loggers

Exclusive LCD display (400/200 Series Data Loggers) – An LCD display confirms logger operation and provides current sensor readings. View how much rain has fallen or the current temperature during a freeze event – without downloading to a PC.

Built in data logger – 400 Series Loggers have a logger capacity of 15,000 measurements (3,750 per channel using all four channels); 200 Series Loggers have a capacity of 7,000 measurements (3,500 per channel using both channels). Select measurement intervals from 1 to 120 minutes. A 30 minute interval will record for 78 days before the station's memory is full. Data is stored in safe, non-volatile memory.

Battery Powered – State-of-the-art low power consumption electronics are supported by an 8-month battery power source (CR2032 included). No solar panels to purchase and maintain.

Customize – Customizable with up to four unique external plug-in sensors. Change monitoring parameters from one season to the next, simply by connecting a different sensor - keeping investment costs down while making more profitable decisions. **See pages 28-29 for sensor options.**

Cost-Effective Mini-Stations For:

- Early pest/disease forecasting
- Soil moisture measurement
- Field research/ microclimate data
- Degree-day tracking

DESCRIPTION	INTERNAL SENSOR	EXTERNAL PORTS	LCD DISPLAY
MODEL 450 ITEM 3684	TEMPERATURE RELATIVE HUMIDITY	2	YES
MODEL 425 ITEM 3683	TEMPERATURE	3	YES
MODEL 400 ITEM 3685	NONE (EXTERNAL ONLY)	4	YES
MODEL 250 ITEM 3682	TEMPERATURE RELATIVE HUMIDITY	NONE	YES
MODEL 225 ITEM 3681	TEMPERATURE	1	YES
MODEL 200 ITEM 3680	NONE (EXTERNAL ONLY)	2	YES

Customize Your Logger with These Accessories

WatchDog Data Shuttle
Launch and download your Shuttle to transport your weather data. Also, a convenient way to read out and relaunch WatchDog Data Loggers (except Model 100) and bring the data back to your host PC. 128K memory holds data from up to 13 full 100 and 200 Series Loggers and 7 full 400 Series Loggers. Use with SpecWare software to launch and offload to your desktop PC. Fail-safe, non-volatile EEPROM memory provides added dependability and convenience. Does not work with 2000 Series Weather Stations.
Item 3679

Radiation Shield
Protect your data logger from rain, solar radiation, or other sources of heat that can distort measurements. Removable top for easy access.
Item 3663

WatchDog Sliding Enclosure
Water-resistant enclosure mounts to a pole or post. Front plate slides off for easy access. Not recommended for use with loggers featuring internal temp/RH sensors.
Item 3658

WatchDog® 100 Series Data Loggers

WatchDog 100 Series Loggers

The most affordable way to track environmental conditions for analysis. Each logger includes sensor(s), 8-month battery, internal clock and fail-safe EEPROM data memory enclosed in a durable casing. Select measurement intervals from 1 to 120 minutes. (A typical data interval of 30 minutes provides 73 days of data before memory is full). Blinking LED light confirms logger is recording.

DESCRIPTION	INTERNAL SENSOR	EXTERNAL PORTS	LCD DISPLAY
MODEL 150 ITEM 3612WD	TEMPERATURE RELATIVE HUMIDITY	0	NO
MODEL 130 ITEM 3610TLW	TEMPERATURE LEAF WETNESS	0	NO
MODEL 125 ITEM 3617WD	TEMPERATURE EXTERNAL TEMPERATURE	0	NO
MODEL 120 ITEM 3554WD	RAINFALL	0	NO
MODEL 115 ITEM 3635WD	RAINFALL	1	NO
MODEL 110 ITEM 3618WD	TEMPERATURE	0	NO

WatchDog Model 100 Button Loggers

Don't let their small price and size fool you! The water-resistant (IP56), stainless steel encased, WatchDog Model 100 Button Logger is powerful enough to log 2,000 or 8,000 data points. Choose temperature-only models or temperature and humidity. **Snap-in Docking Station and SpecWare software required for data downloading, analysis and reporting.**

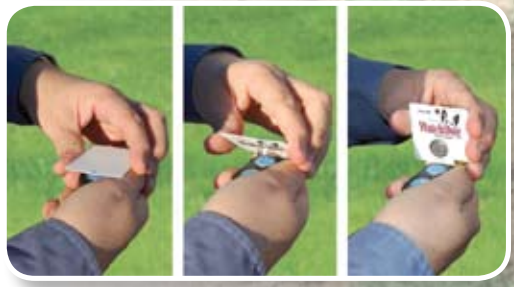
DESCRIPTION	INTERNAL SENSOR	EXTERNAL PORTS	LCD DISPLAY
MODEL 100 T/RH ITEM 3621WD Temp Range: -4 to 185°F(-20 to 85°C) Temp Accuracy: ±1.1°F from +5 to 149°F(±0.6°C from -15 to +65°C) Humidity: 0 to 100%, ±5%	TEMPERATURE RELATIVE HUMIDITY	0	NO
MODEL 100 8K ITEM 3620WD Range: -40 to 185°F(-40 to 85°C) Accuracy: ±1.1°F from +5 to 149°F (±0.6°C from -15 to +65°C)	TEMPERATURE	0	NO
MODEL 100 2K ITEM 3619WD Range: -40 to 185°F(-40 to 85°C) Accuracy: ±1.8°F from -22 to 158°F(±1.0°C from -30 to +70°C) Use included plastic bag when measuring soil temperature	TEMPERATURE	0	NO

Docking Station

Item 3655K **WatchDog Model 100 Button Docking Station**

WatchDog 100 Series

- *Degree-day tracking*
- *Soil temperature monitoring*
- *HAACP, HVAC and microclimate information*



Data Logger Stations

Customize Your Station Without the Cost of Complex Hardware!

Measure only what you need with WatchDog Data Loggers!

3684PDSR

3680SM2

3680SM

WatchDog Plant Disease Stations

Choose from two types of plant disease stations to monitor current and historical plant disease severity indicators.

WatchDog 2000 Series Plant Disease Station (not shown)
Receive real-time conditions and set condition alarms to your PC. SpecWare software required to launch, download and analyze data. Includes WatchDog Mini Station Model 2450 with unique LCD display. Allows you to view current conditions as well as track severity indicators from onboard plant disease models. **(see page 24 for full description of Mini Station)**. **Wireless communication available (pages 26-27)**.

Item 3684WDPD **WatchDog 2000 Series Plant Disease Station**

The WatchDog Plant Disease Station
Data log current and historical plant disease severity indicators. Includes a Watchdog Model 450 Data Logger, temperature, humidity, leaf wetness and rainfall sensors. SpecWare software required to download and analyze data. University-validated disease models (sold separately) can be added for more accurate disease and pest monitoring **(page 35)**.

Item 3684PDSR **WatchDog Plant Disease Station**

WatchDog Irrigation Stations

Affordably monitor, compare and evaluate soil moisture levels from two to three user-defined soil depths.

WatchDog 2400 WaterScout Irrigation Station
Includes WatchDog Model 2400 Mini Station and (2) WaterScout SM 100 Soil Moisture Sensors. Monitor current conditions remotely using optional wireless communications.

Item 3685SM2 **WatchDog 2400 WaterScout Irrigation Station**

WatchDog 400 Irrigation Station (3-Sensors) (not shown)
Includes WatchDog Model 400 Data Logger, Watermark Soil Moisture Sensors (3) and Protective Sliding Enclosure.

Item 3685SM **WatchDog 400 Irrigation Station**

WatchDog 200 Irrigation Station (2-Sensors)
Includes WatchDog Model 200 Data Logger, Watermark Soil Moisture Sensors (2) and Protective Sliding Enclosure.

Item 3680SM **WatchDog 200 Irrigation Station**

WatchDog 130 Leaf Wetness/Temperature Logger

Monitor and record leaf wetness and temperature within your crop canopy. Useful for spray scheduling and pest modeling. Includes WatchDog Model 130 Data Logger, leaf wetness sensor and mini radiation shield. University-validated disease models (sold separately) can be added for more accurate disease and pest monitoring **(page 35)**. **Requires SpecWare software. SpecWare Pro required for disease models (page 34)**

Item 3610TLW **Leaf Wetness/Temperature Logger**

WatchDog Soil/Air Temperature Station

Install these mini-data logging stations across multiple microclimates to study soil and air temperature trends. Includes WatchDog Model 125 Data Logger and mini radiation shield. **SpecWare software required (page 34)**.

Item 3617WDRS **Soil/Air Temperature Station**

WatchDog 120 Data-Logging Rain Gauge

Provides high accuracy with a low-maintenance tipping bucket design

Record and monitor rain events with a high accuracy, low-maintenance tipping bucket rain collector. Meets World Meteorological Organization guidelines with an 8in(20.5cm) diameter collector. Included WatchDog Rain Logger records accumulated rainfall during each interval (maximum of 2.55in(6.5cm) per interval). Select recording intervals from 1 to 120 minutes. Logger capable of holding 7,000 rain interval events before resetting. **Requires SpecWare software (page 34) for downloading, analysis and reporting.**

Rain collector mounting bracket and hardware included. User-replaceable 3V battery lasts 8 months. WatchDog rain collector and SpecWare software can be programmed to record rainfall in either metric(mm) or US(in) units. Accuracy: ±2% at 1in(2.54cm) per hour.

Item 3554WD **Data-Logging Rain Gauge**

WatchDog 115 Rain Logger

Connect to your existing rain gauge. The WatchDog rain logger records accumulated rainfall over time. Select recording Intervals from 1 to 120 minutes [maximum of 2.55in(6.5cm) per interval]. Logger capable of holding 7,000 rain interval events before resetting. Flashing LED confirms operation. Includes weatherproof enclosure and 8-month battery. **Requires SpecWare software (page 34) for downloading, analysis and reporting.**

Item 3635WD **WatchDog 115 Rain Logger**

SpecWare™ Software and Disease Models

Management solutions for:

- Report generation
- Insect & Disease models
- Irrigation scheduling

Spec 9 Pro Software

Award-winning SpecWare software delivers crucial information to growers and researchers in an easy-to-use interface. Import data files from other applications and plot graphs quickly and easily. Set sensor alarms that call your phone or pager for frost, rainfall and other conditions. Import data files from more applications. Customize and save your important reports. Spec 9 Pro and Spec 9 Basic are powerful tools for growers, researchers or other users that need the best data at the right time.

AE50 outstanding innovations
AWARD WINNER
FOR TECHNOLOGY INNOVATION

Features:

- Download data from SpectrumWeather.com
- For calibrated sensors, enter the adjustment values, and Spec 9 Pro will apply them before saving the data.
- Graph on-the-fly with an interactive graphing window.
- Build, customize and save your most important report formats or choose from thirteen standard reports.
- Add optional insect and disease models to forecast pest pressures and reduce pesticide costs. Produce reports with graphs for each pest.
- Set a frost alarm that will call your mobile phone or pager at frost temperatures or other sensor conditions.
- Automate logger downloads with wireless or directly connected stations. Generate scheduled log files for data-to-web applications or create an XML file that can be posted on the web.
- Find and use data easily with an open file management system. All logger data is stored in one file per month, simplifying data sharing and exporting.
- International features include handling date, time and numbers with regional formats, setting English or Spanish language, and Metric or US measurements.

Item 3654P9 Spec 9 Pro Software
Item 3654P9X Spec 9 Pro Extra User License
Item 3654P9U Spec 9 Pro Upgrade
Item 3654P9U8 Spec 9 Pro Upgrade from Spec 8 Pro
Connect WatchDog Stations and Loggers to PCs or laptops lacking a serial port
Item 3661USB USB-to-Serial Adapter

COMPARING SPEC 9 BASIC TO SPEC 9 PRO

	Basic	Pro
View Data		
On-demand graphing	✔	✔
Manage Data		
Download data from SpectrumWeather		✔
Calibration adjustment		✔
Automatic data append	✔	✔
Single file per logger	✔	✔
International data format	✔	✔
Log option for web uploads		✔
Reports		
Standard reports	✔	✔
Custom reports		✔
Sensor (frost) alarm		✔
"Pest Alert" report models		OPT
Communications		
Direct connect or modem	✔	✔
Wireless capability		✔
Dial up modem		✔
Auto download		✔
Supported Products		
2000 Series Stations		✔
Data Loggers: 100/200/400 Series	✔	✔

Spec 9 Basic Software

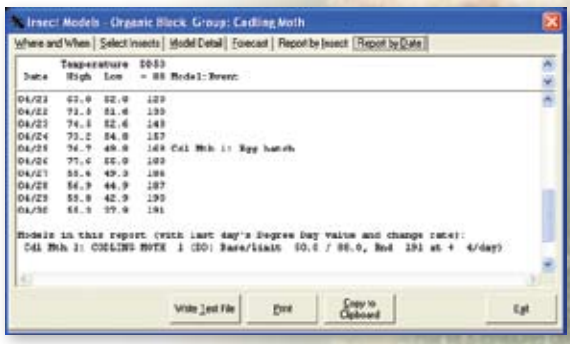
Easily download, analysis and produce basic reports from your weather data accumulated thru WatchDog Data Loggers and older series WatchDog Weather Stations. Eliminate valuable time exporting the data and performing calculations in tedious spreadsheet programs. Spec 9 Basic automatically assigns each WatchDog Data Logger or Weather Station to its own "logger location" directory, which is appended every time you download new data. **Spec 9 Basic does not support disease models or the 2000 Series Weather Stations.**
Includes CD, PC interface cable and manual. **Requires Windows 98 or later, CD-ROM drive, and one free serial port.**

Item 3654B9 Spec 9 Basic Software
Item 3654B9X Spec 9 Basic Extra User License
Item 3654B9U Spec 9 Basic Upgrade
Connect WatchDog Stations and Loggers to PCs or laptops lacking a serial port
Item 3661USB USB-to-Serial Adapter

Spec 9 Pro Models

Disease and Insect Models

Become more proactive in the fight against disease and pesky insects by adding a disease and insect forecast module to your Spec 9 Pro software. Save money by spraying only when necessary. Quickly produce the documentation when needed to support your IPM decisions. Each package uses field-tested and validated algorithms along with the data you collect to forecast the potential for the appearance of your crop's most notorious enemies.



Codling Moth Insect Model

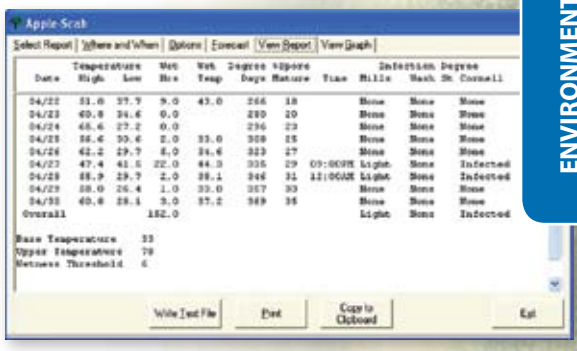
Forecast Model Packages

Item 3656GA — Grape Alert Package

Required Sensors: Leaf wetness, relative humidity and temperature
Models Included:
Powdery Mildew* (Thomas-Gubler)
Black Rot* (Spotts)
Downey Mildew
Botrytis
Phomopsis Cane Leaf Spot
Insect models

Item 3656AP — Apple/Pear Alert Package

Required Sensors: Leaf wetness and temperature
Models Included:
Apple Scab* (Modified Mills, Cornell, Washington State
Fire Blight (Maryblyt, Cougarblight)
Sooty Blotch/Flyspeck
Insect Models



Apple Scab Report

Item 3656TU — Turf Alert Package

Required Sensors: Air and soil temperature, relative humidity and rain
Models Included:
Brown Patch (Schumann)
Pythium (Nutter, Schein)
Dollar Spot (Hall, Mills/Rockwell)
Insect Models

Item 3656PO — Potato Alert Package

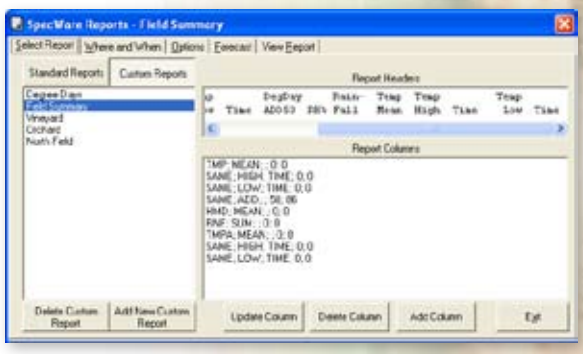
Required Sensors: Temperature, relative humidity and rain
Models Included:
Early Blight
Late Blight (BliteCast)
Insect Models

Item 3656TO — Tomato Alert Package

Required Sensors: Leaf wetness and temperature
Models Included:
Tomcast*
Insect Models

Item 3656CH — Cherry Alert Package

Required Sensors: Leaf wetness and temperature
Models Included:
Leaf Spot
Insect Models



Custom Reports

**Runs on WatchDog 2000 Series Mini Stations*

ENVIRONMENT

WatchDog® Sprayer Station

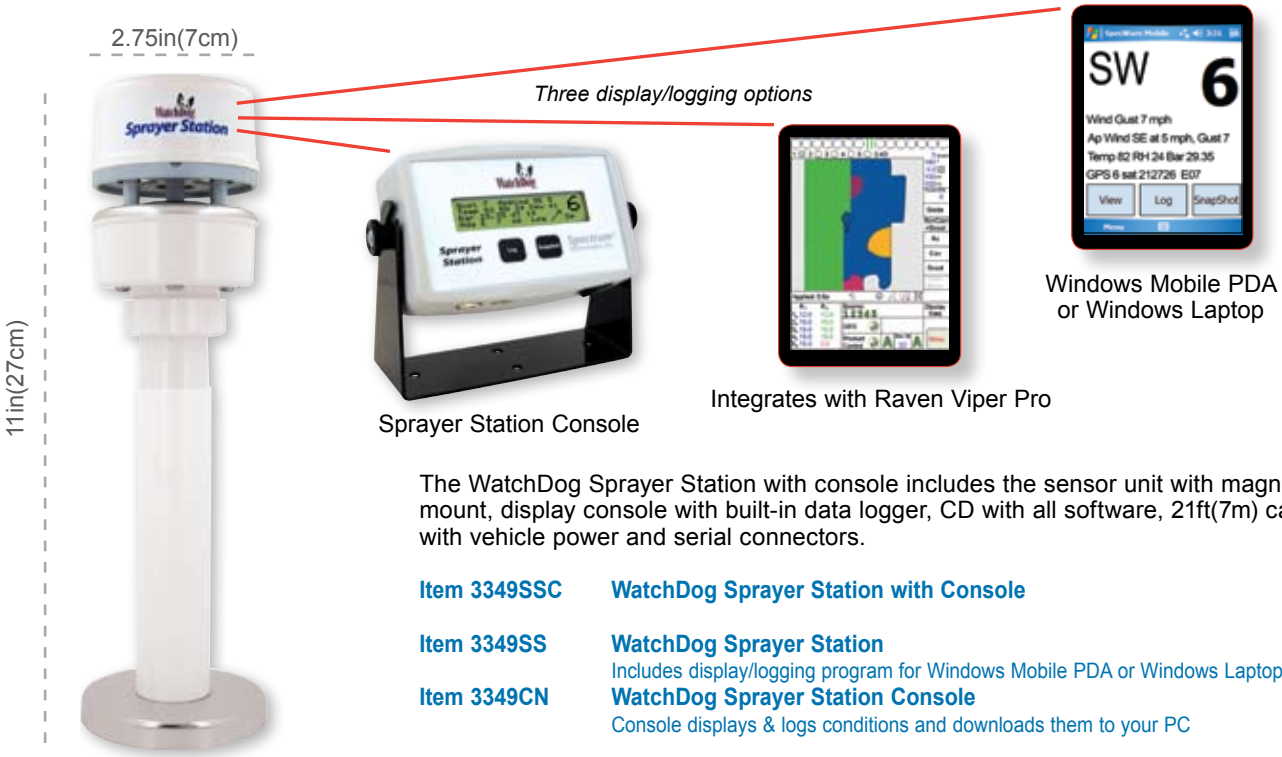
WatchDog® Sprayer Station

Effective management of pesticide drift is increasingly important to pesticide applicators. Now you can monitor and data log weather conditions with the ultrasonic WatchDog Sprayer Station. Accurate data helps pesticide applicators make important decisions regarding weather conditions that affect safety, drift, and proper pesticide application. User controlled data logging of weather conditions provides evidence of suitable conditions for pesticide application.

Smaller than a can of soda, this all-in-one weather station measures air temperature, humidity, dew point, wind chill, barometric pressure and apparent wind speed and direction. It handles adverse conditions with a UV stabilized, compact housing that is fully waterproof and resistant to chemicals. Reliability is enhanced by eliminating moving parts: the traditional wind vane and cups have been replaced with ultrasonic transducers.

The WatchDog Sprayer Station is more than a compact and capable weather station. While on-the-go, the station uses its internal compass and GPS to adjust the wind sensor values by subtracting the vehicle speed and direction to compute the true wind speed and direction.

Display current conditions: wind speed & direction, temperature, humidity, barometric pressure, and GPS parameters (vehicle speed & direction, location, and satellite signal strength). Continuously log your weather parameters at a user-selectable rate or hit the snapshot button to capture current conditions



The WatchDog Sprayer Station with console includes the sensor unit with magnetic mount, display console with built-in data logger, CD with all software, 21ft(7m) cable with vehicle power and serial connectors.

Item 3349SSC **WatchDog Sprayer Station with Console**

Item 3349SS **WatchDog Sprayer Station**
Includes display/logging program for Windows Mobile PDA or Windows Laptop

Item 3349CN **WatchDog Sprayer Station Console**
Console displays & logs conditions and downloads them to your PC

WatchDog Sprayer System Sensors:

- Apparent Wind Speed and Direction
- GPS: Course and Speed
- True Wind Speed and Direction (computed)
- Air Temperature
- Relative Humidity
- Dew Point (computed)
- Barometric Pressure

SPECIFICATIONS FOR SPRAYER STATION

Wind Speed Range:	0.6 to 114 mph (1 to 184 km/h)
Wind Speed Resolution:	0.1 mph (0.2 km/h)
Wind Speed Accuracy:	±1.1 mph (±1.9 km/h) or ±4% @ 32-122°F (0-50°C)
Wind Direction Resolution:	1°
Wind Direction Accuracy:	±1.5° above 32°F (0°C)
Operating Temperature:	-22° to 122°F (-30° to 50°C)
Temperature Accuracy:	±2.7°F (±1.5°C) with wind above 2.3 mph (3.7 km/h)
Relative Humidity Range:	10 to 95%
Relative Humidity Accuracy:	±5% with wind above 2.3 mph (3.7 km/h)
Barometric Pressure Range:	25 to 34 in-Hg (850 to 1150 hPa)
Barometric Pressure Accuracy:	±1.5%
Power Supply Voltage:	10 to 16 VDC

Ground condition monitoring

ENVIRONMENT

WatchDog® WeatherTrackers

Air Temperature:
-4° to 158°F (-20° to 70°C)
±1°F (± 0.6°C)

Leaf Wetness:
Either wet or dry

No Computer Needed

Management solutions for:

- Degree-day tracking
- Chill-hour calculators
- Disease forecasting
- DLI/DIF temperatures

AE50 outstanding innovations
AWARD WINNER
FOR TECHNOLOGY INNOVATION

WatchDog® WeatherTrackers

Record and display conditions in your orchard, vineyard or greenhouse that can alert you to insect and plant disease pressure. You have significant investment in your crop and can't afford losing fruit quality or yield. That's why an affordable, user-friendly WeatherTracker – measuring conditions specific to your crop – makes sense for you. If you save one fungicide spray, you have probably paid for your WeatherTracker and put money in your pocket. Values are calculated based on sensor readings taken every 15 minutes. Put this award-winning product to work for you.

Degree days – Program up to three degree-day memories and one chill-hour memory. The WeatherTracker's solar radiation shield and 15-minute degree-day data point interval results in exceptionally accurate degree-day calculation.

Built-in Data Logger – Store your events in fail-safe, non-volatile memory. You can even replace the batteries without losing valuable weather data. Your WeatherTracker has enough memory for a complete growing season and then some.

LCD display – Displays the current conditions in addition to the daily high/low temperature readings, degree days, leaf wetness hours*, disease pressure*. (DLI/DIF Daily Light Integral and DIF temperature aid in growing greenhouse plants) You can recall the last 30 days of detail data, as well as 12-months of summaries. Current readings are updated every 15 seconds.

*on applicable models.

Battery powered – an 8-month battery power source (9V battery included) means no solar panels to purchase or maintain.

SPECIFICATIONS FOR WEATHERTRACKERS

Item #	Model #	Air Temp	Soil Temp	Quantum Light	Leaf Wetness	Disease Forecast
Greenhouse Growth Tracker 3501PAR	305	Yes	No	Yes	No	No
Degree Day Tracker 3500	300	Yes	No	No	No	No
Heating Degree Day 3521	380	Yes	No	No	No	No
Pest Disease Trackers						
Apple/Pear Pest Alert 3504	320	Yes	No	No	Yes	Apple Scab
Vegetable Pest Alert 3508	325	Yes	No	No	Yes	TomCast
Grape Pest Alert 3512	330	Yes	No	No	Yes	Powdery Mildew

Frost Alarms

Management solutions for:

- Frost protection

WatchDog Frost Alert

Spot frost conditions easily in your vineyard or orchard with the WatchDog Frost Alert. The Frost Alert saves time and labor compared to other monitoring methods. When the temperature approaches freezing, the high-powered LED light (visible from about two miles) changes color and flash frequency to indicate temperature conditions at-a-glance. The Frost Alert will shut off above 37°F(2.8°C) to conserve power. Requires 6V lantern battery (not included).

Item 3430 **WatchDog Frost Alert**

Frost Alert alarm colors

Green – Above 34°F(1°C)

White – 32° to 34°F(0-1°C)

Red – Below 32°F(0°C)
Flashing Red – Below 30°F(-2°C)

ThermAlarm III with Auto Dialer

The Thermalarm III uses hermetically sealed magnetic switches to trigger an alarm condition, eliminating concerns with corrosion and particle contamination of the contacts. This feature is of particular importance in applications where pesticides, high humidity and airborne dust and dirt particles are present. The AutoDialer dials up to four phone numbers with a pre-recorded message when actuated by opened or closed circuit. Auto Dialer runs on battery (not included). AC Adapter sold separately and requires 110V power source.

Item 3424 **ThermAlarm III**
Item 3419 **AutoDialer**
Item 3419AC **AC Adapter**

ENVIRONMENT

Rain Gauges and Hand-Held Meters

Portable management solutions for:

- Crop monitoring
- Rain, temperature and humidity
- CO_2 levels

Digital Tipping Bucket Rain Gauge

Provides NWS accuracy with a self-emptying design

Mount this 8in(20cm) diameter freeze-resistant collector outside and record rainfall with NWS statistical accuracy. Automatically records and displays up to 9.99in(25cm) of rain. Includes long-life lithium battery and 60ft(18m) of cable. Displays in inches only.

Item 3525R **Digital Tipping Bucket Rain Gauge**

Wireless Rain Collector With Temperature

This rain collection cannister system provides cumulative and daily precipitation totals for up to seven days. The collector can be placed up to 100ft(30m) from the main unit. Includes indoor and wireless outdoor thermometers and rain alarm. LCD displays inches/millimeters rainfall.

Item 3526WT1 **Wireless Rain Collector with Temperature**

ET Gauge

Optimizes your water use

Monitor your crop and soil water loss through evapotranspiration and know precisely when to irrigate. Fill it with distilled water, mount it at your growing site and check the levels periodically. Stands approximately 2ft(0.6m) tall.

Item 3710 **ET Gauge**
Item 3710E **Electronic ET Gauge**

Digital Wind/Temp Meter

Essential for pesticide applicators, this palm size, compact temperature and wind meter detects the slightest wind movement. Tough and affordable, this new model measures MPH, M/S, KMH, KNOTS, FT/M and averages wind speed every 2 seconds. Features auto power off and hold button.
Wind speed: 0.5 - 44.7mph(0.8 – 72.0 kmh) (Accuracy ±5%)
Temperature 32-122°F(0-50°C)(Accuracy ±.1°F)
RH: 0 - 100% (Accuracy ±3%)

Item 3141 **Digital Wind/Temp Meter**
Item 3142 **Digital Wind/Temp/RH Meter**

Temp/RH/CO_2 Meters

Monitor indoor air quality and carbon dioxide levels in greenhouses. Handheld meter measures and displays temperature, relative humidity and CO_2 simultaneously.
CO_2: 0 to 2000ppm, Accuracy: ±5%
Temperature: 14 to 140°F (-10°C to 60°C), Accuracy: ±0.9°F (±0.9°C)
RH: 0.0% to 99.9%, Accuracy: ±3%
Includes 4 AA batteries.

Item 3440 **Handheld Temp/RH/CO_2 Meter**

Wall-mount unit has the same features as Item 3440. Also includes a 12VDC adapter.

Item 3445 **Wall-mount Temp/RH/CO_2 Meter**

Temperature/RH Pens

Get accurate temperature and humidity readings fast from a pocket-sized meter. Features °F or °C scales, min/max memory, data hold, auto power-off, and a patented rotating cap to protect the sensor. CR2032 battery included.
Temperature: 14 to 140°F (-10 to 60°C), Accuracy: ±1°F (±0.6°C)
RH: 5 to 95% (3401), 0 to 100% (3402), Accuracy: ±3%

Item 3401 **Temperature/RH Pen**

Same features as Item 3401, plus displays dew point and wet bulb temperature.

Item 3402 **Temperature/RH/Dew Point/Wet Bulb Pen**

IR Crop Temp Meter

Infrared technology makes difficult measurements fast, easy and affordable. An excellent tool for measuring the temperatures of turf and plant canopies. Use selectable laser pointer to identify target area. Features backlit LCD display and includes 9V battery, wrist strap and case. Distance to Target Ratio: 8:1. Fixed emissivity: 0.95. Temperature: -40 to 600°F (-40 to 320°C), Accuracy: ±2% or ±3.6°F (±2°C)

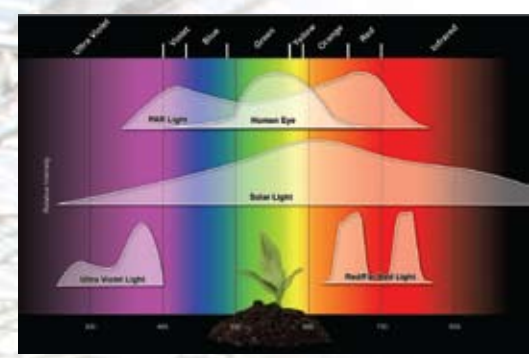
Item 2956 **IR Temp Meter**

IR Crop Temp/External Soil Temp Meter

Use one lightweight handheld device to easily measure both leaf and soil temperatures. Features backlit LCD display and includes 9V battery, wrist strap and case. Distance to Target Ratio: 3:1. Fixed emissivity: 0.97.
IR Temperature: -40 to 149°F(-40 to 65°C), Accuracy: ±2°F (±1°C)
Probe Temperature: 23 to 149°F(-5 to 65°C), Accuracy: ±1°F (±0.5°C);
-40 to 23°F(-40 to -5°C), Accuracy: ±2°F (±1°C)

Item 2958 **IR Temp/External Temp Meter**

FieldScout® Light Meters



LIGHT HAS ECONOMIC VALUE

As the driving force for photosynthesis, light is fundamentally important to crop production. Plant growth and development is significantly influenced by both the quantity and the quality of light. Light energy is relevant to other factors too. The ET calculation (evapotranspiration) for irrigation scheduling uses solar radiation as a key variable. Leaf wetness periods or high humidity, which affect disease pressure, can be mitigated with sunny days versus cloudy days. It is essential that growers understand this important variable in order to efficiently produce quality plants.

Vist www.specmeters.com and view our entire "Measuring Light" Brochure!

3412

3414F

3413F

FIELDSCOUT® Red/Far-Red Meter

Plants use the Red/Far-Red light ratio to determine how crowded they are, and grow tall or full accordingly. Previously, Red/Far-Red measurement required expensive spectroradiometers or sensors, and post-measurement computation. The FieldScout meter displays the Red/Far-Red ratio on the LCD screen, and with the push of a button, the 660nm and 730nm readings.

Item 3412 **FieldScout Red/Far-Red Meter**

FIELDSCOUT® UV Meter

Monitor critical UV radiation (250-400nm) with this handheld meter. Particularly useful for determining UV filtering capacity of greenhouse shades and glass barriers. Range is 0-200.0 µmol m^{-2} s^{-1} (full sunlight).

Item 3414F **FieldScout UV Meter**

FIELDSCOUT® Quantum Meters

Measure light used for plant growth. This handheld quantum meter measures photosynthetically active radiation (PAR) from 400-700nm, with a range of 0-2000 µmol m^{-2} s^{-1}. PAR is a more valuable measurement than foot-candles as it measures only the light used by plants for photosynthesis. Available in a variety of configurations for your convenience.

Item 3415F **FieldScout Quantum Meter**
Item 3415FSE **FieldScout Dual Solar/Electric Quantum Meter**
Item 3415FXSE **FieldScout Dual Solar/Electric Quantum Meter - External Sensor**
Item 3415FQF **FieldScout Quantum and Foot-Candle Meter**

FIELDSCOUT® Foot-Candle Meter

This affordable light measurement solution displays immediate light level in terms of foot-candles. Precision photo diode with cosine correction.

Item 3413F **FieldScout Foot-Candle Meter**

Red/Far-Red Meter

FIELDSCOUT External Light Sensor Meter

Meter can read any of Spectrum's light sensors, which come with 6ft(2m) cables. Just plug in a sensor, choose it on the LCD display, and start measuring UV, Quantum Light, or Solar Radiation. Sensors can also be used with WatchDog Weather Stations and Data Loggers.

Item 3415FX **FieldScout External Light Sensor Reader**

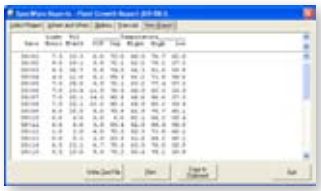
Light sensors sold separately:

Item 3668I **Quantum Light Sensor (PAR Light)**
Item 3668I3 **Quantum Light 3 Sensor Bar**
Item 3668I6 **Quantum Light 6 Sensor Bar**
Item 3670I **Silicon Pyranometer Sensor (Solar Radiation)**
Item 3676I **UV Sensor**

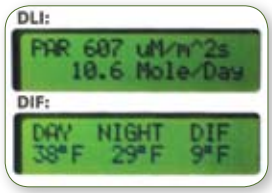
WatchDog Model 2475 Plant Growth Station

Light intensity, DLI, average temperatures, degree days and more! The Plant Growth Station monitors and records temperature, humidity, and light conditions anywhere in your greenhouse. Easily check current and up to twelve months of historical data on the LCD display. Calculate Daily Light Integral and compare to university guidelines (from your extension or at www.specmeters.com) to adjust your shade and light hours. **Requires SpecWare software (page 34-35).**

Item 3686WD **WatchDog Model 2475 Plant Growth Station**



SpecWare plant growth report



Displays Daily Light Integral and Day/Night Temperature Difference on the LCD

"Measuring DLI inside the greenhouse can be very revealing, since growers usually rely on their eyes to determine the light levels and the human eye is a terrible light sensor because it is so effective at adjusting to different light environments."

James E. Faust
Associate Professor of Horticulture
Clemson University

ENVIRONMENT

WatchDog WeatherTracker
Model 305 Greenhouse Growth Tracker

No Computer Needed

Keep tabs on the conditions affecting your plants with the Greenhouse Growth Tracker. Includes a temperature sensor for tracking degree-days, and a quantum light sensor to measure your plants' light exposure over time (in moles/day). Model 305 is a comprehensive tool to assess physiological maturity of your plants.

- Stand-alone device – see important information on the LCD screen – without a PC!
- One-button review of 30 days of values and 12-months of summaries.
- LCD display (updates every 20 seconds) with easy-to-use keypad.
- 9V battery with 8-month life; memory protection in case of power loss.

Item 3501PAR **WeatherTracker Model 305 Greenhouse Growth**

SOIL AND WATER

- **Soil and Water**:
  pH, Soil Moisture, Soil Compaction, Water Quality and Soil Gases

THE IMPORTANCE OF SOIL AND WATER MANAGEMENT...

Plant growth is supported with a strong root system. Along with proper nutrition levels, plants need access to adequate air and water in the soil to develop a strong root system. Determine soil porosity by measuring compaction levels at multiple depths. Monitor soil moisture over time with in-situ sensors and in multiple locations with portable soil moisture meters. Utilize compaction and soil moisture data to make informed management decisions.

AE50 outstanding innovations
AWARD WINNER
FOR TECHNOLOGY INNOVATION

SpecMaps™

Make management decisions based on your field's spatial variability

Get maximum value out of your portable FieldScout® meters by using SpecMaps, Spectrum's web mapping utility, allows you to create 2-dimensional color charts of geo-referenced data from any FieldScout meter with a serial input connected to a GPS receiver. The contour plots give a powerful visual image of the variability across the site. The data point charts give you the ability to see the impact of individual data points on the interpolated map. A summary of the data is also included along with a histogram to give an additional visual image of the data.

Statistical interpolation is used to create charts that give you and your clients an instant visual picture of the spatial variability across the landscape. Data is archived at the server so your maps can be easily accessed from any computer with access to the internet. Monitor localized dry spots on a golf green, compacted zones on a soybean field, or nitrogen-deficient sections of your vineyard. SpecMaps is your edge in effective crop and soil management.

Item 3652 — **SpecMaps Web Mapping Utility (1-Year Subscription)**

SpecMaps™ ProTurf

Created with the turf professional in mind, SpecMaps ProTurf adds features to SpecMaps designed specifically for monitoring irrigation efficiency in turf. SpecMaps ProTurf allows for the inclusion of sprinkler head locations as well as the radius of throw for each individual head. The measurement summary includes a computation of the lower quartile Distribution Uniformity. This is a useful addition to the traditional irrigation audit because it is based on water in the soil profile rather than irrigation water applied to the surface.

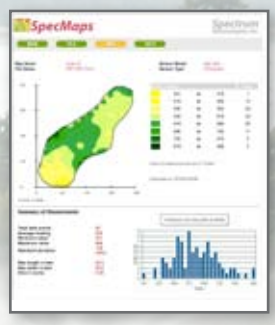
Item 3652PT — **SpecMaps ProTurf Web Mapping Utility (1-Year Subscription)**

Item3652PTUP — **Upgrade to SpecMaps ProTurf**

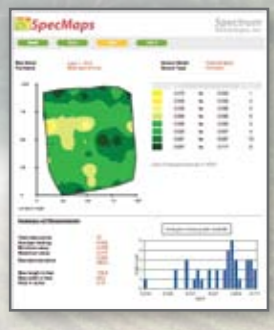
SpecMaps Web Mapping Utility

Compatible Spectrum FieldScout and SPAD Products:

- FieldScout CM 1000
- FieldScout TCM 500
- FieldScout pH 110
- FieldScout TDR 300
- FieldScout EC 110
- SPAD 502DL
- FieldScout SC 900

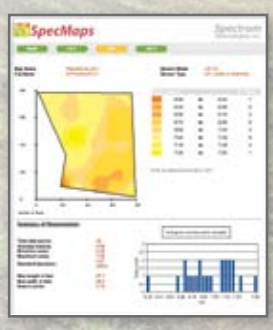


CM 1000 on a fairway: Greener areas indicate healthier turf.



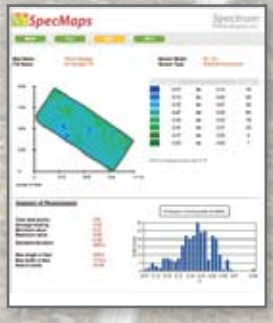
TCM 500 on a lawn: Dark green areas represent healthy turf grass.

SC 900 on a baseball field: Yellow and red spots indicate areas of heavier soil compaction.



pH 110 in a soybean field : Areas with low pH may exhibit symptoms of nutrient deficiency.

SPAD 502 measuring nitrogen content in corn: Dark green areas indicate higher chlorophyll content.



EC 110 on a fairway : Greener areas represent locations of higher salinity.

TDR 300 on a putting green using SpecMaps ProTurf: Showing sprinkler locations and radius of throw.

TDR 300 on a putting green: The areas with higher soil moisture are shown in deep blue.

view the online presentation of the New Irrigation Audit at:
http://www.specmeters.com/ir_audit

SOIL & WATER

Soil Moisture Meters

TDR 300 shown with optional GPS bracket

Management solutions for:

- Precision irrigation
- Optimizing water use

When precision irrigation decisions count, Spectrum offers growers the tools to manage water responsibly and eliminate the guesswork!

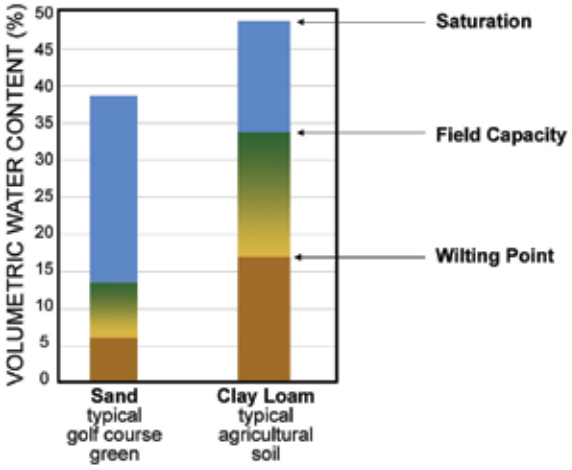
Water management strategies are important as water restrictions become more stringent. Replace the subjective "soil probe and feel" method with precision measurement of soil moisture. Researchers have used this advanced technology for years to gather accurate soil moisture data. Spectrum's TDR (Time Domain Reflectometry) meters measure the volumetric water content in the soil profile.

Portable TDR meters give you the ability to track soil moisture across multiple locations. Soil moisture has been shown to correlate with putting green firmness and playability. Spot check for localized dry spots or even map the soil moisture across an entire field.

Understanding Volumetric Water Content:
Volumetric water content is a measure of the percent of the total soil volume, composed of air, water, and soil, that is occupied by water. At saturation, the volumetric water content will match the porosity of the soil (typically around 50% for most agricultural soils). Saturated soils drain until the capillary forces in the soil are stronger than the pull of gravity. When no additional water will drain due to gravity, the condition is known as Field Capacity. Plant demand and evaporative forces can continue to extract water from the soil until it reaches a condition known as the Permanent Wilting Point. The amount of water a soil can hold is a function of texture, porosity, and organic matter content. Irrigation is recommended between these two conditions. A common irrigation threshold is when the soil is halfway between Field Capacity and Permanent Wilting Point.

Understanding Relative Water Content:
Our TDR meters can display a relative water content on a scale of 0 to 100 corresponding to a user-defined upper and lower soil moisture reference level. Water deficit, the amount of water needed to bring the soil moisture content up to the upper reference level, is also calculated and displayed. The reference levels are easily programmed into the meter with the accompanying software. Create up to 2 management sites based on your soil types and crop needs.

Water Holding Capacity By Soil Type



SPECIFICATIONS FOR TDR SOIL MOISTURE METERS

Measurement Principle: Time-domain measurement methods
Measurement Units: Percent volumetric water content
Resolution: 1.0%
Accuracy: ±3.0% volumetric water content with electrical conductivity – <2mS/cm
Range: 0% to saturation (Saturation typically around 50% volumetric water)
Battery/Life: 4 AAA alkaline batteries; approximately 12-month battery life
Data Logger: (TDR 300) 3,250 measurements without GPS; 1,350 with GPS/DGPS

The TDR 300 simplifies and quantifies the critical balance between adequate soil moisture and playability of green surfaces. The crucial decision of when and how much water to apply is solved with the push of a button.

Sean O'Connor CGCS
Forest Akers Golf Courses
Michigan State University

FIELDSCOUT® TDR 300

Manage water responsibly and reduce operating expenses

AE50 outstanding innovations
AWARD WINNER
FOR TECHNOLOGY INNOVATION

Designed for quick and easy measuring. Internal data logger and RS-232 port allows for geo-referenced soil moisture measuring. Records 3,250 measurements (1,350 with added GPS/DGPS option**). Includes software and PC cable* for data downloads. Order the SpecMaps online web-mapping application **(pages 44-45)** and discover the value of a graphical representation of soil moisture measurements. **Mapping program requires GPS; not included. Rods not included, see below**.

* Spectrum's PC cables connect to a 9-pin serial port. USB-Serial adapter (item 3661USB) required for connection to computers with only USB ports.
** GPS interface requires two cables. The GPS/DGPS cable (item 2950CV5) is available from Spectrum. A PC serial interface cable supplied by the manufacturer of the GPS receiver is also required.

Item 6430FS	TDR 300 Soil Moisture Meter
Item 2950CV5	GPS/DGPS Cable
Item 7250	GPS Unit Mounting Bracket
Item 3661USB	USB-to-Serial Adapter
Item 6430CASE	TDR 300 Carrying Case

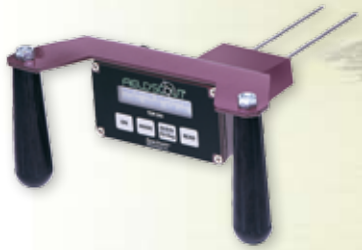
Protect your investment with the TDR 300 Carrying Case

Works with SpecMaps
See pages 44-45 for details

FIELDSCOUT® TDR 200

Designed specifically for those requiring accurate, on-the-spot readings of soil moisture, without data logging capability or geo-referenced measurements. **Rods not included, see below.**

Item 6435FS	TDR 200 Soil Moisture Meter



FIELDSCOUT® TDR 100

Unique model combines a compact handheld display connected to a sophisticated soil water sensing probe with a 5 ft(1.5m) cable. Designed for easy transportation. This meter has no data logging or geo-referencing capability. **Rods not included, see below.**

Item 6440FS	TDR 100 Soil Moisture Meter
Item 6440FSS	Replacement TDR 100 Soil Moisture Probe

TDR Rods

Moisture probe rods come in various lengths to suit the desired depth of moisture measurement. These sturdy stainless-steel rods can be changed in the field.

Item 6428FS	Two 1.5in(3.8cm) Rods
Item 6429FS	Two 3in(7.5cm) Rods
Item 6431FS	Two 4.8in(12cm) Rods
Item 6432FS	Two 8in(20cm) Rods

Soil Moisture Meters

Actual size

WATERSCOUT SM 100 Soil Moisture Sensor

The key is knowing both when and how much to water!

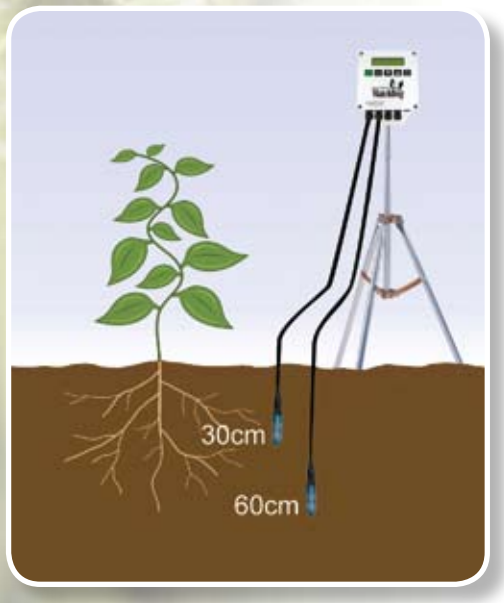
Maintaining a healthy water balance is essential for producing high quality plants. Under-watered plants suffer from nutrient deficiencies, stunting and wilting. Conversely, over-watered plants are more susceptible to disease pressure and less tolerant of dry conditions later on in their life cycle. Extreme over-watering will suffocate the plant and lead to root death.

The new Spectrum WaterScout SM 100 Soil Moisture Sensor measures soil moisture with little or no disturbance to the root zone. The thin shape and pointed tip allows for easy insertion into the soil or growing medium. Use the Soil Moisture Reader to take fast and accurate spot readings. Or, bury the sensor and track soil moisture changes over time with a WatchDog® data logging weather station **(with Spec 9 Pro Software)**. Not compatible with 400/200 loggers. WatchDog Stations sold prior to 2009 must be upgraded. Call for details.

Item 6460 **WaterScout SM 100 Sensor - 6 ft(1.8m)**
Item 6460-20 **WaterScout SM 100 Sensor - 20 ft(6m)**

SPECIFICATIONS FOR WATERSCOUT SM 100 SENSOR

Standard Interface: WatchDog weather station, FieldScout soil moisture reader
Range: 0% VWC to saturation
Power Requirements: 3 to 5V @ 6 to 10 mA
Output: Analog voltage 0.5 - 1.5V for a 3V excitation (ratiometric for other excitation voltages)
Resolution: 0.1% VWC
Cable Length: 6 and 20 ft. standard, extendable up to 50 ft.
Accuracy: 3% VWC @ EC < 8 mS/cm
Sensing Area: 2.4in(6cm) x 0.8in(2cm)

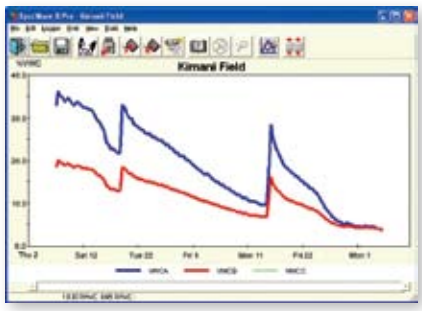


WatchDog Model 2400 shown with two WaterScout SM 100 Soil Moisture Sensors. **See page 32**

FIELDSCOUT Soil Sensor Reader

Allows you to spot-check any number of WaterScout SM 100 sensors in the field. Use when data logging a WaterScout SM 100 sensor is unnecessary. Also reads Watermark and Echo (EC-5, EC-10, EC-20) sensors (may require separate adapter).

Item 6465 **FieldScout Soil Sensor Reader**



SpecWare Pro showing data from two WaterScout SM 100 sensors at different depths.

Watermark Soil Moisture Meter

Place a Watermark Sensor in the root zone of your crop or turf and use the handheld digital meter to get an instant reading of moisture tension from 0 (saturated) to 200 (dry) centibars. Use in conjunction with evapotranspiration estimates to fine-tune irrigation scheduling. One digital meter reads all your sensors. Each sensor includes a 5ft(1.5m) extendable cable.

Item 6455	Watermark Digital Meter
Item 6450	Watermark Sensor

Understanding Soil Moisture Tension
Soil moisture tension is the measurement of how strongly water is held in the soil. Water is held in the soil by capillary forces as well as the attraction of the water molecule to itself and to electrically charged clay particles. Soil moisture tension is measured in units of pressure (centibars or kilopascals). The tension at which irrigation is recommended depends on the soil and crop, but typically falls somewhere between 30 and 50 centibars.

Irrometer Tensiometers

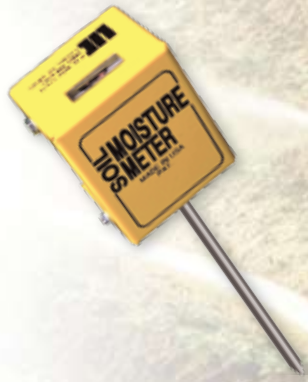
Reliable Irrometer tensiometers are exellent indicators for irrigation scheduling. With four different depths to choose from, they tell you how hard plant roots are working to draw water from the soil. Use model “R” for general use with field and tree crops or model “LT” (see our Web site) for coarse soils or greenhouse media. **Service Kit is required.** Service kit includes handheld vacuum pump, fluid concentrate, 25 chart forms and reference book.

Item 6420	12in(30cm) Depth
Item 6421	18in(45cm) Depth
Item 6422	24in(60cm) Depth
Item 6423	36in(90cm) Depth
Item 6425	Service Kit - Required

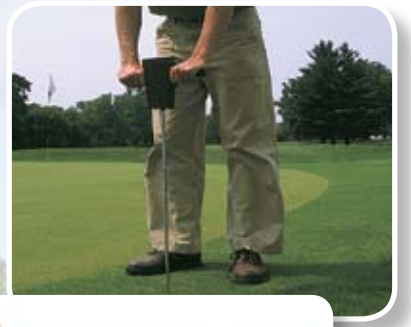
Economy Soil Moisture Tester

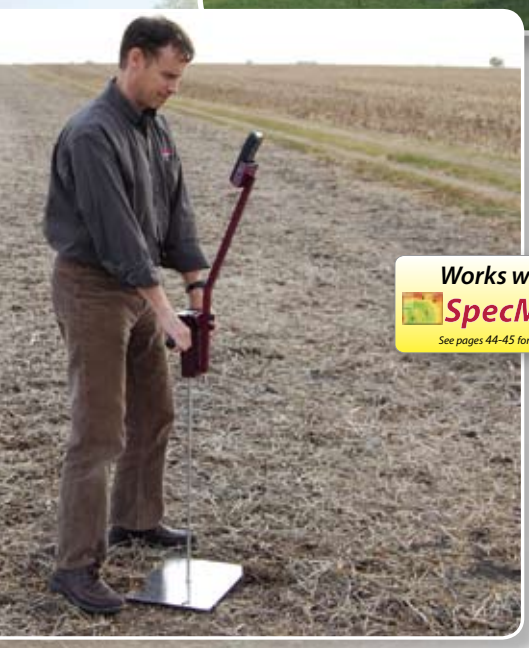
This analog soil moisture meter measures any type of soil with just one calibration. A capacitance-type sensor located at the tip of the shaft provides instant results ranging from 0 (dry) to 10 (saturated). Comes with a 6-month warranty.

Item 6400	9in(22cm) Soil Moisture Tester
Item 6405	24in(60cm) Soil Moisture Tester



Soil Compaction Meters





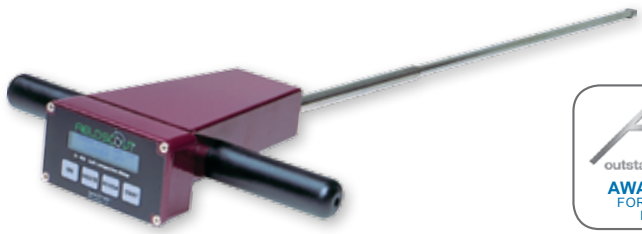
FieldScout SC 900 with Depth Target and optional GPS Mounting Bracket

FIELDSCOUT® SC 900 Soil Compaction Meter

Improve your yield potential by locating and monitoring soil compaction

Exclusive ultrasonic depth sensor provides soil depth reading in 1in(2.5cm) increments as the load cell measures the penetration resistance. Compaction data is displayed in PSI or kPa. Built-in data logger and RS-232 port allows for geo-referenced soil compaction measurement. Records up to 772 profiles (579 with added GPS/DGPS** option). Includes software and PC cable* for data downloads. Order the SpecMaps online web-mapping application **(pages 44-45)** and discover the value of graphical representation of soil compaction measurements. **Mapping program requires GPS; not included.**

* Spectrum's PC cables connect to a 9-pin serial port. USB-Serial adapter (item 3661USB) required for connection to computers with only USB ports.
** GPS interface requires two cables. The GPS/DGPS cable (item 2950CV5) is available from Spectrum. A PC serial interface cable supplied by the manufacturer of the GPS receiver is also required.



AE50 outstanding innovations
AWARD WINNER FOR TECHNOLOGY INNOVATION

Item 6110FS	FieldScout SC 900 Soil Compaction Meter
Item 2950CV5	GPS/DGPS Cable
Item 7250	GPS Unit Mounting Bracket
Item 3661USB	USB-to-Serial Adapter
Item 6110FST	Replacement Depth Target

SPECIFICATIONS FOR FIELDSCOUT SC-900

Measurement Units:	Cone Index (PSI or kPa)
Resolution:	1in(2.5 cm), 5 PSI (35 kPa)
Accuracy:	± 0.5in(1.25 cm) Depth, ±15 PSI (103 kPa) Pressure
Range:	0–18in(0–45 cm), 0–1,000 PSI (0–7,000 kPa)
Battery/Life:	4 AAA alkaline batteries; approximately 12-month life
Data Logger Capacity:	772 profiles without GPS; 579 profiles with GPS

Spectrum Soil Compaction Meter

Super-affordable analog tester. Unseen soil compaction can limit root growth and water and nutrient absorption. An easy-to-read display and durable design make this meter ideal for in-field use and multiple measurements. Features a stainless steel rod with depth marks of 3, 6, 9, 12, 15, and 18in (17.6, 18.2, 22.9, 38.1, and 45.7cm)

Item 6101	Spectrum Soil Compaction Tester
Item 6106	Replacement Tip

Soil Compaction Meter

Meter enables you to identify compacted areas in pounds per square inch so that you can use deep tillage or other practices recommended for your area. Features a stainless steel rod with depth marks of 3, 6, 9, 12, 15 and 18in (17.6, 18.2, 22.9, 38.1 and 45.7cm)

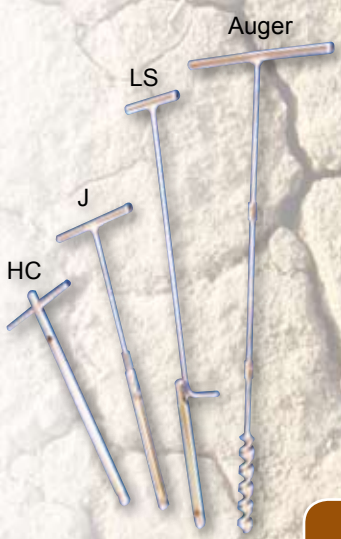
Item 6100 **Soil Compaction Tester**
Item 6410 **1/2in Replacement Tip - Fine Soils**
Item 6415 **3/4in Replacement Tip - Coarse Soils**

Soil Sampler Probes

Essential for monitoring soil nutrients and nematodes in the soil profile. Soil sampling is extremely important to ensure optimum plant health. Soil samplers allow you to produce a uniform sample for use with your own on-site tests or to send to a lab.

Model HC: overall length of 20.5in(50cm), an 18in(46cm) sampling tube and an 8in(20cm) wide handle.
Model J: overall length of 24in(61cm), a 12in(30cm) removable sampling tube and an 8in(20cm) wide handle.
Model LS: 3ft(1m) heavy-duty sampler with an 11in(28cm) sampling tube, cut-out sleeve, and foot step.
Auger Tube Kit: overall length of 3ft(1m) assembled w/ 8in(20cm) auger length and 12in(30cm) wide handle.

Item 6510 **Model HC Soil Sampler**
Item 6505 **Model J Soil Sampler**
Item 6519 **Model LS Soil Sampler**
Item 6500 **Auger Tube Kit**



Tough Soil Thermometers

Built of tough, corrosive-resistant stainless steel, these pocket-sized thermometers are available with easy-to-read digital or analog displays. Dual mode digital tester features slow updates at 15-second intervals or fast updates every second.

Measures temperatures from 0° to 160°F(-17° to 71°C) (accuracy ± 2°). Economical analog tester measures 25° to 125°F (accuracy ± 1°). Adjustable nut provides quick calibration.

Item 6300 **Digital Temperature Tester - 4.5in(11.5cm)**
Item 6305 **Analog Temperature Tester (°F only) - 4.5in(11.5cm)**
Item 6310 **Long-Stem Thermometer - 8in(20cm)**
-58° to 302°F(-50° to 150°C) (Accuracy ± 1.8°)

Spectrum®
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"To Measure Is To Know"

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Simple, Accurate, Rapid Measurements

NEW for 2009!

WATERSCOUT™
SM 100 Soil Moisture Sensor

See page 48 for more details!

The key is knowing both when and how much to water!